

DOCUMENT RESUME

ED 183 827

CE 024 388

TITLE Military Curricula for Vocational & Technical Education. Offset Printing, 5-5.

INSTITUTION Defense Mapping School, Ft. Belvoir, Va.; Ohio State Univ., Columbus. National Center for Research in Vocational Education.

SPONS AGENCY Bureau of Occupational and Adult Education (DHEW/OE), Washington, D.C.

PUB DATE Apr 74

NOTE 942p.; Sections of small type will not reproduce well.

EDRS PRICE MF06/PC38 Plus Postage.

DESCRIPTORS Behavioral Objectives; *Charts; Course Descriptions; Curriculum Guides; Graphic Arts; High Schools; Industrial Arts; *Industrial Education; Learning Activities; Lesson Plans; *Maps; *Photography; Postsecondary Education; *Printing; Programed Instructional Materials; *Reprography; Semiskilled Occupations; Textbooks; Workbooks

IDENTIFIERS Bindery Workers; Lithography; Military Curriculum Project; Offset Lithography; Photolithography

ABSTRACT

These lesson plans and student materials--some programmed texts and a workbook--for a secondary-postsecondary-level course in offset printing are one of a number of military-developed curriculum packages selected for adaptation to vocational instruction and curriculum development in a civilian setting. Purpose stated for the 250-hour course is to provide a working knowledge of the operation of lithographic offset presses in the reproduction of maps, charts, and other printed-line work and a general knowledge of the fundamentals of printing-bindery. The course consists of two sections: Press Fundamentals (8 lessons, 110 hours), and Offset Press Operating Procedures (5 lessons, 140 hours). The lesson plans include objectives, hours of class time, training aids and devices, student materials and equipment, references, lesson outlines suggesting instructional tactics, and student practical exercises and printing problems with grading sheets and answers. Student programmed texts, which are provided for a number of the lessons, also contain self-tests. The student workbook provides student outlines for each lesson which include objectives, study references, supplementary information, and space for student comments. A glossary of photolithographic terms and pertinent excerpts from the Army technical manual, Offset Photolithography and Map Reproduction, are also provided. (YLB)

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Medical Lab
Supervision
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Conditioning
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Military Curricula for Vocational & Technical Education

DEPARTMENT OF HEALTH
EDUCATION & WELFARE
NATIONAL INSTITUTE OF
EDUCATION

OFFSET PRINTING

5-5



THE NATIONAL CENTER
FOR RESEARCH IN VOCATIONAL EDUCATION
THE OHIO STATE UNIVERSITY

This military technical training course has been selected and adapted by The Center for Vocational Education for "Trial Implementation of a Model System to Provide Military Curriculum Materials for Use in Vocational and Technical Education," a project sponsored by the Bureau of Occupational and Adult Education, U.S. Department of Health, Education, and Welfare.

MILITARY CURRICULUM MATERIALS

The military-developed curriculum materials in this course package were selected by the National Center for Research in Vocational Education Military Curriculum Project for dissemination to the six regional Curriculum Coordination Centers and other instructional materials agencies. The purpose of disseminating these courses was to make curriculum materials developed by the military more accessible to vocational educators in the civilian setting.

The course materials were acquired, evaluated by project staff and practitioners in the field, and prepared for dissemination. Materials which were specific to the military were deleted, copyrighted materials were either omitted or approval for their use was obtained. These course packages contain curriculum resource materials which can be adapted to support vocational instruction and curriculum development.

The National Center Mission Statement

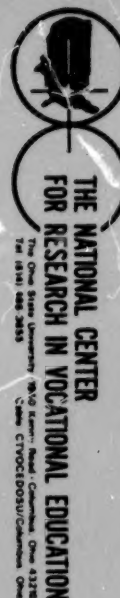
The National Center for Research in Vocational Education's mission is to increase the ability of diverse agencies, institutions, and organizations to solve educational problems relating to individual career planning, preparation, and progression. The National Center fulfills its mission by:

- Generating knowledge through research
- Developing educational programs and products
- Evaluating individual program needs and outcomes
- Installing educational programs and products
- Operating information systems and services
- Conducting leadership development and training programs

FOR FURTHER INFORMATION ABOUT Military Curriculum Materials

WRITE OR CALL

Program Information Office
The National Center for Research in Vocational
Education
The Ohio State University
1960 Kenny Road, Columbus, Ohio 43210
Telephone: 614/486-3655 or Toll Free 800/
848-4815 within the continental U.S.
(except Ohio)



Military Curriculum Materials for Vocational and Technical Education

Information and Field
Services Division

The National Center for Research
in Vocational Education



Military Curriculum Materials Dissemination Is . . .

an activity to increase the accessibility of military-developed curriculum materials to vocational and technical educators.

This project, funded by the U.S. Office of Education, includes the identification and acquisition of curriculum materials in print form from the Coast Guard, Air Force, Army, Marine Corps and Navy.

Access to military curriculum materials is provided through a "Joint Memorandum of Understanding" between the U.S. Office of Education and the Department of Defense.

The acquired materials are reviewed by staff and subject matter specialists, and courses deemed applicable to vocational and technical education are selected for dissemination.

The National Center for Research in Vocational Education is the U.S. Office of Education's designated representative to acquire the materials and conduct the project activities.

Project Staff:

Wesley E. Budke, Ph.D., Director
National Center Clearinghouse
Shirley A. Chase, Ph.D.
Project Director

What Materials Are Available?

One hundred twenty courses on microfiche (thirteen in paper form) and descriptions of each have been provided to the vocational Curriculum Coordination Centers and other instructional materials agencies for dissemination.

Course materials include programmed instruction, curriculum outlines, instructor guides, student workbooks and technical manuals.

The 120 courses represent the following sixteen vocational subject areas:

Agriculture	Food Service
Aviation	Health
Building & Construction	Heating & Air Conditioning
Trades	Machine Shop
Clerical	Management & Supervision
Occupations	Meteorology & Navigation
Communications	Photography
Drafting	Public Service
Electronics	
Engine Mechanics	

The number of courses and the subject areas represented will expand as additional materials with application to vocational and technical education are identified and selected for dissemination.

How Can These Materials Be Obtained?

Contact the Curriculum Coordination Center in your region for information on obtaining materials (e.g., availability and cost). They will respond to your request directly or refer you to an instructional materials agency closer to you.

CURRICULUM COORDINATION CENTERS

EAST CENTRAL

Rebecca S. Douglass
Director
100 North First Street
Springfield, IL 62777
217/782-0759

MIDWEST

Robert Patton
Director
1515 West Sixth Ave.
Stillwater, OK 74704
405/377-2000

NORTHEAST

Joseph F. Kelly, Ph.D.
Director
225 West State Street
Trenton, NJ 08625
609/292-6562

NORTHWEST

William Daniels
Director
Building 17
Agricultural Park
Olympia, WA 98504
206/753-0871

SOUTHEAST

James F. Shill, Ph.D.
Director
Mississippi State University
Drawer DX
Mississippi State, MS 39762
601/325-2510

WESTERN

Lawrence F. H. Zane, Ph.D.
Director
1776 University Ave.
Honolulu, HI 96822
808/948-7834

Developed by:
United States Army

Development and
Review Dates:
April 1974

Occupational Area:
Communications

Target Audiences:
Grade 11 - Adult

Print Pages: 895

Microfiche: 15

Availability:
Vocational Curriculum
Coordination Centers

[illegible]

X Materials are recommended but not provided.



THE NATIONAL CENTER
FOR RESEARCH IN VOCATIONAL EDUCATION

Course Description:

The course is designed to provide a working knowledge of the operation of lithographic offset presses in the reproduction of maps, charts, and other printed line work, and a general knowledge of the fundamentals of printing--bindery. The course consists of two sections covering 250 hours of instruction.

Press Fundamentals contains eight lessons covering 110 hours of instruction:

- Introduction to Photolithography (1 hour)
- Introduction to Offset Press Operation (1 hour)
- Operation of a Paper Cutter (1 hour)
- Operator's Maintenance (11 hours)
- Prepare Controls, Feeder, and Delivery Assemblies (23 hours)
- Prepare Cylinder Assembly (21 hours)
- Prepare Dampening Assembly (23 hours)
- Prepare Inking Assembly (24 hours)

Offset Press Operating Procedures consists of five lessons requiring 140 hours of instruction:

- Prepare Press for Operation (4 hours)
- Practice Printing (32 hours)
- Identify Printing Problems (1 hour)
- Print a Five Color Map (64 hours)
- Bindery (39 hours)

Both teaching and student materials are contained in the course. Printed instructor materials include detailed subject matter outlines; listings of objectives, references, teaching aids; student exercises and printing problems. Student materials include a number of programmed texts with self-tests; student workbook; and pertinent excerpts from U.S. Army technical manual, "Offset Photolithography and Map Reproduction" (TM5-245).

LESSON PLAN

INTRODUCTION TO PHOTOLITHOGRAPHY

740-303-A-010-010
740-304-A-010-010

OFFSET PRINTING
OFFSET DUPLICATING



April 1974

DEFENSE MAPPING SCHOOL — FORT BELVOIR, VIRGINIA

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ORIENTATION SHEET

OFFSET DUPLICATING

SEGMENT

INTRODUCTION, CAMERA
PROCESSOR AND PLATE-
MAKER CONVERTER
(13 hours)

BLOCKS

INTRODUCTION
(3 hours)

Camera/Copier
operation
(10 hours)

LESSON

INTRODUCTION TO
PHOTOLITHOGRAPHY
(1 hour)

Introduction to the
Offset Duplicating
Course
(2 hours)

Offset Duplicating
Equipment and Opera-
tor Maintenance
(132 hours)

LESSON REQUIREMENTS SHEET

COURSE: Offset Printing

LESSON: Introduction to Photolithography

OBJECTIVE: Given an orientation, shown a training film on reproduction equipment, materials and processes used in offset printing to produce military maps, charts and other related materials, the student will identify major pieces of reproduction equipment and name several products as outlined in TM 5-245.

TIME: 1 Hour: .6C, .4F

TRAINING AIDS AND DEVICES:

1. Audio-Visual Aids or Devices:
 - a. 16mm sound projector
 - b. Projection screen
2. DA Training Aids: None
3. Service Training Aids: Film SF 12-102

MATERIALS AND SUPPLIES:

- | | |
|------------------------------------|--------------------|
| 1. Lithographic stone | One per class |
| 2. Line negative and positive | One each per class |
| 3. Flat | One per class |
| 4. Peel coat | One per class |
| 5. Scribe sheet | One per class |
| 6. Topographic map | One per class |
| 7. Lithographic plate (with image) | One per class |

EQUIPMENT: None

TRAINING AREA:

Indoor: 24-man classroom equipped with desks, chairs and electrical outlets

Outdoor: None

TRANSPORTATION REQUIREMENTS: None

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ADDITIONAL PERSONNEL AND DEMONSTRATION TROOPS:

1. Instructors: One instructor to operate the projector.
2. Demonstration Troops: None

TEXT REFERENCES:

1. Instructor References: TM 5-245 (7-70), Offset Lithography and Map Reproduction, Chap 1, para 1-1 thru 2-4.
The Lithographers Manual, Vol I, Chap 1, pp 1:1.
Lithographer 3 & 2, NAVPERS 10452-B, Chap 1, pp 1 thru 7.
2. Student References: None
3. Average Student Homework Time: None

LESSON OUTLINE

LESSON: Introduction to Photolithography

TIME	SUBJECT MATTER OUTLINE	INSTRUCTIONAL TACTICS
	<u>INTRODUCTION</u> On behalf of the Director of the Defense Mapping School, _____, the Graphic Arts Division Chief, _____ and the instructors of the Graphic Arts Division, I welcome you to the school. Here in the Graphic Arts Division of the Defense Mapping School we train U. S. and allied personnel in the photolithographic arts. This is part of the Defense Mapping Agency which has the responsibility to produce military topographic maps for the armed services. Other printing is accomplished by the Adjutant General which has the responsibility of producing administrative material such as forms and texts. The Psychological Warfare Branch has the responsibility for printing leaflets and other psychological materials. You have been selected for this training because your background or aptitude indicate you could be adept at performing effectively in the Graphic Arts field. Let us take a look at how you would fit into the Graphic Arts field. Let us take a look at how the school functions in relation to turning out a military map. The three major areas in which instruction is presented in relation to the production of a military map are: survey, cartography and reproduction. You are students in the reproduction area of map production, the printing field. The same skills used to reproduce maps are applied to the printing of other types of printed matter; therefore, the basic principles learned here can be utilized in commercial printing. In this lesson, you will be given an orientation of the courses and	The Director, Deputy Director or Division Chief may wish to address the class, in which case he will be introduced at this time.

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TIME	SUBJECT MATTER OUTLINE	INSTRUCTIONAL TACTICS
	shown a film on the photolithographic and offset printing techniques and equipment. You will see some of the materials and processes used in offset printing as it relates to producing military maps, charts and related printing matter. What is Photolithography and what is Topography? Photolithography is the photographic method of planographic printing, based on the fact that grease (lithographic ink) and water do not mix. Photolithography encompasses all the steps necessary to produce the end item, the printed matter: photographing the copy, processing the negative, making the printing plate and printing the image on the paper stock. Topography is the art or practice of graphic delineation in detail, usually on maps or charts, of natural and man-made features of a place or region especially in a way to show their relative positions and elevations. Basically topography is the study of the earth's surface.	
	<u>DEVELOPMENT</u> 00:03 1. GRAPHIC ARTS COURSES a. Lithographic Photocopyer b. Lithographic Stripping and Platemaking c. Offset Printing d. Offset Duplicator e. Reproduction Equipment Repair 00:05 2. PHOTOLITHOGRAPHY a. Historical background b. Definition and theory c. Related materials	Use as required when lesson is presented in more than one class. Describe course(s) length, MOS, job title, and give closing date. Ask questions to check student understanding. Instructor will define and explain the difference between them. Show lithostone and refer to Senefelder's work with "chemical printing".

TIME	SUBJECT MATTER OUTLINE	INSTRUCTIONAL TACTICS
		Explain the advent of Photography in 1839 and how it brought on the working partnership between photography and lithography which came to be known as photolith or photolithography. Check student understanding by asking a representative student to define the terms.
00:08	3. INTRODUCE TRAINING FILM	Explain that the film covers the various methods used in the whole printing industry and that printing is an everyday accomplishment that is normally taken for granted. Show training film SF 12-102. Questions and comments will follow the film with the instructor checking the student understanding by the questions the students ask or by instructor asking questions.
00:34	4. COURSES OF INSTRUCTION a. a. Lithographic Photography b. Lithographic Stripping and Platemaking c. Offset Printing d. Offset Duplicating Equipment Operator e. Reproduction Equipment Repair f. Multilith 1250 Repair	Explain the production responsibilities of the various branches by relating the film to our task of map making. Show samples of products used in each course, i.e., for Lithographic Photography show line negative and positive, for Lithographic Stripping and Platemaking show a flat and a peel coat, for Offset Printing show a finished printed map and for Reproduction Equipment Repair explain that students are

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TIME	SUBJECT MATTER OUTLINE	INSTRUCTIONAL TACTICS
00:44	5. PROHIBITED REPRODUCTION EXPLANATION (QUESTIONS AND COMMENTS PERIOD)	trained in the working knowledge of the repair and maintenance of reproduction equipment. Tell students they will receive training for 7 weeks or more depending on the course they are in whereas their civilian counterparts have an apprenticeship for 7 - 8 years. Explain that while in the Graphic Arts Division they will encounter actual production work. Check student understanding by asking questions. Instructor will pass out to each student an extract from DA Technical Bulletin AG 4, Copying Equipment, dtd Oct 65. Instructor will scan list while students follow each item. Instructor will check students understanding by asking questions as he covers this form with the students.
00:46	<u>APPLICATION</u>	Student understanding is checked in various ways throughout the lesson. See instructional tactics.

TIME	SUBJECT MATTER OUTLINE	INSTRUCTIONAL TACTICS
	<u>SUMMARY</u> During the past hour you have been exposed to the theory and history of Photolithography. You saw from the film the vastness of the printing industry, its broad application and specifically how it provides the capability to reproduce printed matter by the fastest practical method. The products used by other courses in Graphic Arts were covered so you will be able to identify the equipment, products used, and end products produced in each course of the Graphic Arts Division. Later you will receive a listing of items which are not authorized to be reproduced. Your next lesson will consist of instruction on Introduction to Offset Press Operation (Introduction to the Offset Duplicating Course).	

INSTRUCTOR NOTES

1. GRAPHIC ARTS COURSES

a. Historical data: The Defense Mapping School was established on 1 July 1972 under the Headquarters, Defense Mapping Agency. Prior to that date it was the Department of Topography, United States Army Engineer School.

b. Anecdotes: None

c. Content: The instructor will outline the length of each course to include closing dates and explain the military occupational specialties of each title.

d. Tactics: A description of the scope of each course may be presented as a CCTV tape.

e. Explanation: This lesson was added to meet administrative requirements and to orient students to the program of instruction. Offset Printing Course FOI, submitted to DMS, November 1968.

2. PHOTOLITHOGRAPHY

a. Historical data:

(1) Lithography: Lithography is based on the simple principle that grease will not mix with water. It was discovered in Europe in 1796 by a man named Alois Senefelder. He found quite by accident that if he wrote with grease pencil on a certain type of stone and then wet the stone with water, that he could apply ink to the grease image without inking up the rest of the stone. He could then make as many prints as he desired by simply wetting and re-inking the stone before each impression. By further experimentation he found that by etching the stone with a weak acid solution, after the greasy ink had been applied to the image, it seemed to set the image and make the stone more water receptive. While he realized that this process had printing possibilities he called the process "lithography" which means "stone writing". The inherent property of Bavarian limestone when the surface was properly smoothed down had a certain porousness which caused it to become hydrophilic which means to attract and hold moisture. The technique remained an art medium until it was found that zinc with a properly treated surface to make it hydrophilic and later aluminum provided the means of high speed printing from cylinder pressure instead of the slow flatbed press. The newly developed printing plates were a definite step forward in increasing the capability and versatility of the lithographic process.

Two more developments later were to further enhance the process. It was soon discovered that direct contact of the metal plate against the paper caused the plate image and the plate surface to wear out quickly. It was found that if a third cylinder covered with a rubber blanket was added to the cylinder press which already had an impression cylinder the image could be transferred from the plate cylinder to the blanket covered cylinder;

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thence to the paper carried on the impression cylinder the image transfer would be "offset", hence the terminology "offset printing". This method extended the life of the image on the plate and provided for better ink-water control, thus printing a cleaner, sharper image on to the paper or other material.

(2) Photolithography: During the same time period of development and application of the metal plates another development was taking place. This was the development of photography in 1839. By 1860 the images were being put on the zinc plates with the aid of the camera producing an image on a photo chemical light sensitive gelatin mounted on an acetate base to become known as film. The plate coating on the first zinc grained plates was a combination of egg albumin as the colloid base with ammonium dichromate or bichromate with a preservative added, as the light sensitive element that was hardened by exposure to the sun or later by arc light (actinic) through the clear image area of the negative. This hardened image area at this point was not water soluble but the unexposed area remained water soluble and was coated with a developer ink to make the image ink receptive, then rinsed with water dissolving the water soluble unexposed area, leaving the exposed hardened ink developed image on the plate. The plate was then covered with gum arabic coating to prevent oxidation and was ready for the press.

b. Anecdotes: None

c. Content: The instructor should use a lithographic stone to explain the discovery of lithography. A negative, metal press plate with image and related mapping products should also be used to show how photolithography developed to its present state. The theory of lithography should be fully explained.

d. Tactics: The theory of lithography can be effectively demonstrated by placing a small quantity of ink in a glass containing water. The ink will form globules and not fully mix with the water. Another graphic demonstration is to mark a piece of paper with a grease pencil and then allow water to run over the surface of the paper. This will illustrate the theory of lithography. Samples of a flat, a press plate and a map sheet will show the finished product of each stage of photolithographic printing.

e. Explanation: All courses in the Graphic Arts Division, DMS, are required to see the film, "Lithography of Offset Printing". This commercially produced film shows the stages of photolithographic printing and a varied assortment of reproduction equipment. The film is in color with a running time of 22 minutes.

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LESSON PLAN

INTRODUCTION TO OFFSET PRINTING COURSE
740-303-A-010-020

OFFSET PRINTING



July 1974

DEFENSE MAPPING SCHOOL — FORT BELVOIR, VIRGINIA

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ORIENTATION SHEET

OFFSET PRINTING COURSE

SEGMENTSBLOCKSLESSONS

PRESS
FUNDAMENTALS
 (104 Hours)

Course Introduction
 (14 Hours)

MAJOR ASSEMBLIES OF
THE OFFSET PRESS
 (90 Hours)

Prepare Controls,
 Feeder And Delivery
 Assemblies
 (28 Hours)

Prepare Cylinder
 Assembly
 (19 Hours)

PREPARE DAMPENING
ASSEMBLY
 (19 Hours)

Prepare Inking
 Assembly
 (24 Hours)

Offset Press Operating
 Procedures
 (172 Hours)

LESSON REQUIREMENTS SHEET

COURSE: Offset Printing

LESSON: Introduction to Offset Printing Course

OBJECTIVE: Introduce the principles of modern lithographic offset press operation, instructional breakdown of the offset press course, grading procedures and the safety precautions so the student can generally state the type of equipment used in the course, has an understanding of the grading system used and the safety procedures necessary while operating the offset press.

TIME: 1 Hour

TRAINING AIDS AND DEVICES:

1. Audio-Visual Aids or Devices:

CCTV 1016, "Method of Study"

2. DA Training Aids: None

3. Service Training Aids:

#A-109-57 Schematic drawing of a typical offset press

MATERIALS AND SUPPLIES:

- | | |
|--|-----------------|
| 1. Chalk, white | As required |
| 2. Pencils | One per student |
| 3. 3-Ring notebook | One per student |
| 4. Handout 1. Student reference material receipt | One per student |
| 5. Handout 2. Student questionnaire | One per student |
| 6. Handout 3. Legal to print form | One per student |
| 7. Handout 4. List of safety rules | One per student |
| 8. Handout 5. Policies and procedures | One per student |
| 9. Handout 6. DMS Guide to Studying | One per student |

EQUIPMENT: None

TRAINING AREA:

Indoor: 30-man classroom equipped with desks, chairs and chalkboard.

Outdoor: None

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TRANSPORTATION REQUIREMENTS: None

ADDITIONAL PERSONNEL AND DEMONSTRATION TROOPS: None

TEXT REFERENCES:

1. Instructor References: TM 5-245 (7-70) Offset Photolithography and Map Reproduction, Chap 8, para 8-1 and 8-2.
2. Student References: None
3. Average Student Homework Time: None

TRAINING AIDS

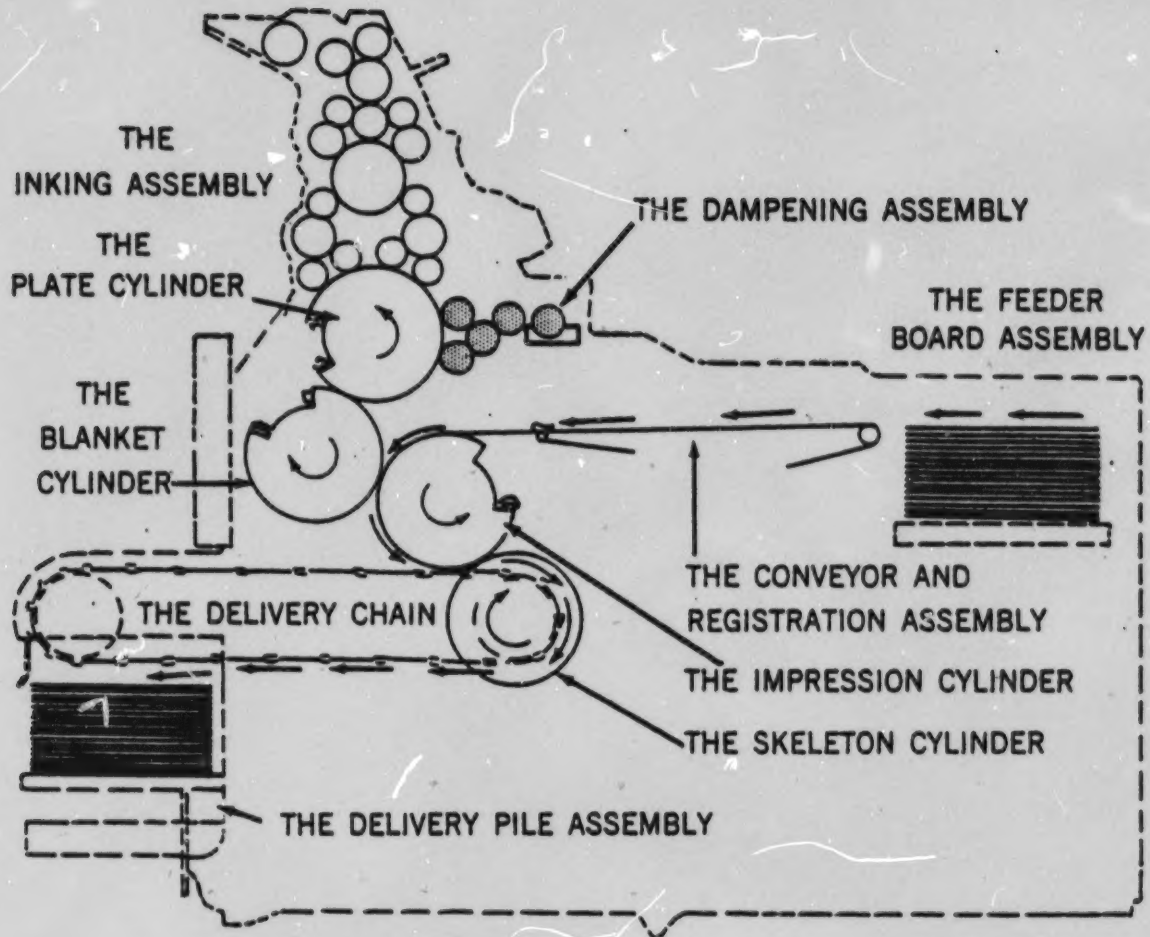


Figure 1 #A-109-57 Schematic drawing of a typical Offset Press

ANNEX A to
Lesson Requirement Sheet
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740-303-A-010-020

LESSON OUTLINE

LESSON: Introduction to Offset Printing Course

TIME	SUBJECT MATTER OUTLINE	INSTRUCTIONAL TACTICS
	<u>INTRODUCTION</u> 00:00 During the INTRODUCTION TO PHOTOLITHOGRAPHY, you saw a film describing the different methods of printing and some of the processes involved in the lithographic process. You as an offset pressman will be involved with one of the final, most important steps in the printing process, that of printing the product produced by the camera section, layout and plate section, which you will see during the tour of the Graphic Arts Division. During this lesson, you will learn the course sequence or how we are going to teach you step by step how to be an offset pressman. You will learn the rules of safety and we will cover the administrative matters concerning this course. This information is necessary to you as a student to know what is to be accomplished during the next eight and one half weeks. Upon completion of this lesson, you will have an overall picture of what to expect throughout this course. Remember this about mistakes: Politicians can explain theirs Lawyers can appeal theirs Doctors can bury theirs Our mistakes are printed, we cannot appeal, explain, bury, erase, hide, disguise, alter, cover, excuse or talk away ours. Do your best to avoid mistakes before they happen.	NOTE: Prior to the class, instructor will ensure that all the necessary forms are available, a three-ring binder with either a Harris Operating Manual or TM 5-245 and other prescribed handouts are included in the binder and placed on each student's desk.

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TIME	SUBJECT MATTER OUTLINE	INSTRUCTIONAL TACTICS
	<u>DEVELOPMENT</u>	
00:05	1. COURSE SEQUENCE a. Paper cutter b. Operators maintenance c. Control, feeder and delivery assembly d. Cylinder assembly e. Dampening assembly f. Inking assembly g. Prepare press for operation h. Practice printing I i. Identify printing problems j. Print a three color map k. Print a five color map and photo map l. Bindery and practice printing II m. Grades	Explain the course sequence. Using figure 1 Training Aid #A-109-57 a Schematic drawing of an offset press, point out the assemblies and show the sequence of the paper and other areas of interest. Ask questions to check student understanding.
00:15	2. TYPES OF OFFSET PRESSES a. ATF-DP Chief 29 b. Harris LXG c. Duplicating machines	Explain each press specifications and feeding system. Check student understanding by asking questions.
00:20	3. SAFETY RULES	Read and explain each item. Stress safety. Ask questions to check student understanding.

TIME	SUBJECT MATTER OUTLINE	INSTRUCTIONAL TACTICS
00:30 00:48	(QUESTIONS AND COMMENTS PERIOD) <u>APPLICATION</u> <u>SUMMARY</u> During this hour of instruction, you learned the sequence of instruction you will have over the next eight and one half weeks. You know the school policy covering safety procedures that you are required to follow. The purpose of this course is to train you to become an offset pressman. The instructors can train you if they have your complete cooperation and attention. What has been covered in this lesson will be put into practical use in your future lessons. During the next hour, you will receive a demonstration on the operation of the paper cutter.	Ask questions to check student understanding. Student understanding was checked throughout the lesson by instructor. (see Instructional Tactics) Student will complete the forms listed in the Lesson Requirements Sheet. Instructor will assist the student when necessary.

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DEFENSE MAPPING SCHOOL
GRAPHIC ARTS DIVISION
FORT BELVOIR, VIRGINIA

DATE _____

INSTRUCTOR _____

Student, Class _____

I, _____
PRINT RANK FIRST NAME MI LAST NAME SSAN

understand that reproduction, by photography, photoprinting, copying, use of miscellaneous duplicators, offset press, proving press, or any other means of duplication of obscene or pornographic literature or pictures is in direct violation of Army Regulations and is punishable under the uniform code of Military Justice.

I further understand that Congress by statute has forbidden the copying of subjects substantially enumerated in the list that follows. Those making such copies are subject to penalties of fine or imprisonment. IGNORANCE OF THE LAW IS NOT A SUFFICIENT EXCUSE!

- | | |
|--|--|
| <p>1. Obligations or securities of the United States Government, such as:</p> <p>Certificates of Indebtedness
National Bank Currency
Coupons from bonds
United States Bonds
Federal Reserve Bank Notes
Treasury Notes
Silver Certificates
Fractional Notes
Certificates of Deposit
Paper Money
Bonds and obligations of the Government
U.S. Savings Bonds
War Savings Stamps
Internal Revenue Stamps
Postage Stamps
Postal Money Orders
Bills, Checks, or Drafts for Money</p> | <p>Compensation Certificates for Veterans of the World Wars
Obligations or securities of any foreign government, banks and corporations
Copyrighted material
Certificates of Citizenship
Immigration papers
Draft Registration Cards
Selective Service Induction Papers
Badges, Identification Cards, Passes or Insignia carried by Armed Forces
Passports</p> |
|--|--|

2. Copying the following is also prohibited in certain states:

Automobile licenses
Driver's permits
Automobile Certificates of Title

SIGNATURE _____

-----EXTRACTED FROM-----

Department of the Army Technical Bulletin TB AG4, Copying Equipment, dated October 1965.

LIST OF SAFETY RULES

OFFSET PRESS OPERATION COURSE

1. Remove all jewelry from hands, arms and necks to include dog tags.
2. Remove fatigue jackets and keep T-shirts tucked in because loose clothing is a hazard when working around an offset press.
3. Arrange tools, rags, chemicals and solvents in a neat and orderly manner. If you are not using these items then put them away.
4. Keep your work area clean. Deposit all waste paper and rags in their proper containers.
5. Wipe up spilled liquids immediately. Put cleaning materials away when finished with clean-up.
6. Keep the press area clear of obstacles.
7. Press controls should be on "SAFE" when the press is stopped.
8. Give a warning before starting the press, shout CLEAR, pause, then start the press.
9. Make no adjustments to the press while it is running.
10. Use caution when handling press plates or paper because they can be the cause of severe cuts.
11. No cleaning of running presses. The press IS faster than you!
12. Thoroughly wash any chemicals you get on your hands.
13. No running or horse play of any kind will be tolerated at any time you are in the school.
14. Report all accidents or injuries immediately to an instructor. You are not qualified to determine the degree of injury but the Army has medical personnel who are.
15. When in doubt about anything in the course, stop and ask an instructor.
16. Smoking is permitted only in authorized areas.
17. If you feel ill, have a toothache, or have anything that might cause you to be distracted from operating machinery, then notify an instructor.

INSTRUCTOR NOTES

1. COURSE SEQUENCE

- a. Historical data: None
- b. Anecdotes: None
- c. Content: The instructor will explain the sequence of the course utilizing the schematic drawing pointing out the various assemblies and explaining their operational function. He will also explain what printing project must be completed to successfully complete the course.
- d. Tactics: This lesson could be taught by using embossographs placed on a magnetic board and explaining the course sequence.

2. TYPES OF OFFSET PRESSES

- a. Historical data: The requirements of military printing have resulted in precise specifications for presses the Army has purchased. Because of the need for mobility in the field the Army had vans built to carry the presses, which had to be modified not only to maintain these specifications but to also be small enough to fit into a van with enough room to effectively operate the offset press.
- b. Anecdotes: None
- c. Content: The instructor will explain the different types of feeding systems, press specifications and general information pertaining to the presses the students will receive their training on.
- d. Tactics: This subject could be taught using O/H projector with transparencies illustrating the specifications and showing the different feeding systems.

3. SAFETY RULES

- a. Historical data: None
- b. Anecdotes: None
- c. Content: The instructor will explain that accidents are the result of doing a job the wrong way, personnel safety factors as well as mechanical and general shop conditions should be considered. Explain that safety procedures should be observed at all times.

STUDENT PRACTICAL EXERCISE

LESSON: Introduction to Offset Printing Course

OBJECTIVE: In the classroom with the required equipment the students will complete the necessary administrative requirements.

MATERIALS AND SUPPLIES REQUIRED:

1. Chalk, white - as required
2. Pencils - one per student
3. Handout questionnaire - one per student
4. Handout receipt form - one per student

EQUIPMENT: None

FACILITIES REQUIRED:

30-man classroom equipped with desks, chairs, and chalkboard.

TRANSPORTATION REQUIREMENTS: None

ADDITIONAL PERSONNEL: None

STUDENT REQUIREMENTS:

During the application of this lesson, the student will be required, with the assistance of the instructor, to fill out the necessary administrative forms.

7/74

SOURCE MATERIALS

LESSON: Introduction to Offset Printing Course

1. Course Sequence - TM 5-245 (7-70), Offset Photolithography and Map Reproduction
 - a. Paragraph 9-3 thru 9-7
 - b. Paragraph 8-3
 - c. Paragraph 8-5 thru 8-13
 - d. Paragraph 8-14 thru 8-16
 - e. Paragraph 8-17 thru 8-21
 - f. Paragraph 8-22 thru 8-24
 - g. Paragraph 8-25 thru 8-30
 - h. Lesson Plan, 740-303-B-010-020, Practice Printing I
 - i. TM 5-245, Appendix E
 - j. Lesson Plan, 740-303-B-020-010, Print a three-color map
 - k. Lesson Plan, 740-303-B-030-010, Print a five-color map and photomap
 - l. Lesson Plan, 740-303-B-040-010, Bindery and Practice Printing II
 - m. Offset Printing Branch, SOP
2. Types of Offset Presses - TM 5-245, Offset Photolithography and Map Reproduction
 - a. Paragraph 8-1
 - b. Paragraph N/A Harris Operating Manual, page X
3. Safety Rules - TM 5-245

Paragraph 8-2
4. Administrative Detail

Offset Printing Branch, SOP

LESSON REFERENCE FILE

**INTRODUCTION TO
OFFSET PRESS OPERATION**

T.440-101



FEBRUARY 1969

US ARMY ENGINEER SCHOOL - FORT BELVOIR, VIRGINIA

TABLE OF CONTENTS

SECTION I	-	Lesson Support Requirements
SECTION II	-	Lesson Outline
SECTION III	-	Source Material
ANNEX A	-	None
ANNEX B	-	None
ANNEX C	-	None

NOTE: This LRF serves as the source of information for all lessons taught on this subject. though length, methods, and objectives will vary with courses. The specific length, methods and objectives will be determined by the FOI and so reflect in the ILPs.

This publication supersedes MLP, T.012-1 (1957), INTRODUCTION TO OFFSET PRESS.

SECTION I
LESSON SUPPORT REQUIREMENTS

SUBJECT: Offset Press Operation

LESSON: Introduction to Offset Press Operation

TRAINING AIDS AND DEVICES:

1. D. A. Training Aids: None
2. Service Training Aids: None

MATERIALS AND SUPPLIES:

1. Chalk: One box, white
2. Eraser: One

EQUIPMENT: None

FACILITIES:

1. Classroom: Equipped with desks and blackboard.
2. Training Area Facilities: None

TRANSPORTATION: None

ADDITIONAL PERSONNEL AND DEMONSTRATION TROOPS:

1. Assistant Instructor(s): One
2. Demonstration Troops: None

TEXT REFERENCES:

1. Required References:
 - a. TM 5-245 (Sep 62), Map Reproduction.
 - b. TM 5-3610-202-15 (Mar 63), Operator, Organizational, and Depot Maintenance Manual.
 - c. Manufacturer's Manual (65), Harris LXG Offset Press.
2. Excerpted References: None

SECTION II LESSON OUTLINE

SUBJECT: Offset Press Operation

LESSON: Introduction to Offset Press Operation

TIME PERIOD (TOTAL): 1 Hour

TYPE OF LESSON: Lecture

OBJECTIVE: To introduce the principles of modern lithographic offset press operation, instructional breakdown of the offset press course, grading procedure and safety precautions.

SUPPORT REQUIREMENTS: Refer to SECTION I

STUDENT REFERENCES: Refer to Schedule of Instruction

INTRODUCTION

00:00 During the first two periods you learned a little about the different methods of printing and you were given the administrative information that you need to know as a student of this course. Do you have any questions up to this point?

During this period you will learn specifically about the Offset Press Course. The information you receive at this time will help you pass this course and will always be useful to you as an offset pressman.

Why is so much time and effort spent in teaching you to become an offset pressman? (Have several students give answers, then elaborate on answers) Among the many reasons is that most of you will return to civilian status, taking with you your skill as an offset pressman. You are being trained to replace those now leaving the service. Also, the military services have found that offset printing is the fastest and most versatile method of printing, and have been expanding this method of printing during the last several years to meet field requirements. In addition to being fast and versatile, offset lithographic printing is the most simple method in that, in most cases, copy can be photographed, the negative used to make a plate and the plate is then put on the press and run.

You have all heard the old saying - doctors bury their mistakes, lawyers explain their mistakes away, and printers print theirs. Why don't you do something about that? Go out there and become so good that you don't have to print any mistakes.

DEVELOPMENT

00:05 1. COURSE SEQUENCE

- a. Control, feeder and delivery assemblies
- b. Cylinder assemblies
- c. Dampening assembly
- d. Inking assembly
- e. Offset press operation

- (1) Practice printing
- (2) Three-color exercise
- (3) Five-color graded exercise

- f. Allied printing subjects

Check student understanding

00:13 2. GRADES

- a. Four written tests
- b. Twelve practical exercises

Check student understanding

00:19 3. OFFSET PRESS TERMINOLOGY

- a. Feeder
- b. Delivery
- c. Gear side
- d. Operator side

Check student understanding

00:22 4. OFFSET PRESS SPECIFICATIONS

- a. ATF model DP
 - (1) Maximum paper size
 - (2) Minimum paper size
 - (3) Maximum image size

b. Harris LXG

- (1) Maximum paper size
- (2) Minimum paper size
- (3) Maximum image size

c. AG printing plant presses

d. Duplicating machines

Check student understanding

00:27 5. THEORY OF OFFSET PRINTING

00:30 6. OPERATION OF THE OFFSET PRESS

Use blackboard to illustrate these points

- a. Inking system
- b. Dampening system
- c. Plate cylinder
- d. Blanket cylinder
- e. Impression cylinder
- f. Paper leaves feeder
- g. Paper held to impression cylinder
- h. Plate rotates under dampeners
- i. Plate rotates under inkers
- j. Plate rotates against blanket
- k. Blanket rotates against paper
- l. Paper moves to delivery board
- m. Cycle repeats itself

Check student understanding

00:40 7. SAFETY

- a. No loose clothing
- b. T-shirts
- c. No jewelry
- d. No tools, rags or equipment on presses
- e. No trash on press or floor
- f. Oil and grease wiped up
- g. Press controls on "safe" when stopped
- h. Warning before starting press
- i. No adjustments on running presses
- j. No cleaning on running presses
- k. Keep hands off running equipment
- l. Wash chemicals off hands
- m. No horse play
- n. No smoking
- o. No running
- p. Report all accidents and injuries

q. When in doubt, stop and ask the instructor

Check student understanding

(QUESTIONS AND COMMENTS PERIOD)

SUMMARY

- 00:47
1. Course Sequence
 2. Grades
 3. Offset Press Terminology
 4. Offset Press Specifications
 5. Theory of Offset Printing
 6. Operation of the Offset Press
 7. Safety
 8. Tie-in to Paper Cutter Operation

SECTION III
SOURCE MATERIAL
INTRODUCTION TO OFFSET PRESS OPERATION

INTRODUCTION

During the first two periods the student was taught a little about the different methods of printing and was given the administrative information that he needs to know as a student in this course.

During this period the student will learn specifically about the Offset Press Course. The information he will receive at this time will help him pass this course and will always be useful to him as an offset pressman.

Why is so much time and effort spent in teaching students to become offset pressmen? (Have several students give answers, then elaborate on answers) Among the many reasons is that most of the students will return to civilian status, taking with them the skills of an offset pressman. They are being trained to replace those now leaving the service. Also, the military services have found that offset printing is the fastest and most versatile method of printing, and have been expanding this method of printing during the last several years to meet field requirements. In addition to being fast and versatile, offset lithographic printing is the most simple method in that, in most cases, copy can be photographed, the negative used to make a plate and the plate put on the press and run.

Most of us have heard the old saying - doctors bury their mistakes, lawyers explain their mistakes away, and printers print theirs. Why not do something about that? Train the student so well that he will not print any mistakes.

DEVELOPMENT

1. COURSE SEQUENCE

The Offset Press Operation Course has five areas that are graded. Each area teaches one phase or operation of the offset press. When a student has successfully completed an operation, he will be ready to progress to the next phase in the operation of an offset press. Each phase begins with a lecture or demonstration. Then the student practices what he has been taught. After the practice period, he will be tested. Minimum passing grade for this course is 70.

a. Control, feeder and delivery assemblies. The controls consist of the electrical controls such as the ON - OFF switches, safety devices and speed controls and the manual controls for the dampening system, the inking system and to start and stop the printing cycle. The student will be taught the location and operation of all the controls on the offset press.

The feeder assembly are those parts of the offset press that feed and control the paper as it moves into the printing cycle. The student will be taught to adjust and load the feeder assembly.

The delivery assembly are those parts of the offset press that take the paper after the printing cycle. The student will be taught to adjust the delivery assembly and to remove the printed stock from the delivery assembly.

b. Cylinder assemblies. The cylinder assemblies consist of the plate cylinder, blanket cylinder, impression cylinder and skeleton cylinder.

The plate cylinder holds the offset printing plate and each student will be taught to attach and to remove the plate and to make the necessary adjustments to the plate on the cylinder or to the cylinder in order to make the image print in the proper place on the paper.

The blanket cylinder holds the rubber offset blanket and the student will be taught to attach and to remove the blanket from the cylinder. He will also be taught to use the proper amount of packing behind the blanket for proper printing pressure.

The impression cylinder is a metal surfaced cylinder that holds the paper during the printing cycle. The student will be taught to adjust it for pressure against the blanket cylinder.

The skeleton cylinder transfers the paper from the impression cylinder into the delivery grippers. The student will also be taught to make any adjustments that may be necessary on this cylinder.

c. Dampening assembly. The dampening assembly holds and transfers the water solution to the plate during the printing cycle. The student will be taught to prepare the solution. All students will be taught to cover the rollers and to adjust the rollers in the press so that an effective transfer of the water solution takes place.

d. Inking assembly. The inking assembly holds and transfers the ink to the plate during the printing cycle. The student will be taught to clean and adjust the inking assembly so that an effective transfer of ink takes place during the printing cycle.

e. Offset press operation.

(1) Practice printing. After learning to operate and adjust the offset press each student will be given several plates and sufficient paper to practice with. They will make all the necessary press adjustments to print an image on the paper that they have to practice with. Students are not graded on this phase. They should be encouraged to ask questions. Later students will be given added time to overcome weak points by further practice.

(2) Three-color exercise. Each student will be issued 500 sheets of paper and three offset plates. One plate is the base or black image. The other plates will be a different color. The students will print the base color first. Then they will print the other colors so that they register with the first color.

(3) Five-color graded exercise. This is a repeat of the three-color exercise except that students will print a five-color map, backed-up with a graded photomap.

f. Allied printing subjects. In addition to learning how to operate an offset printing press, students will also learn how to operate a paper cutter, the folder and the stitching machine.

2. GRADES

a. Four written tests. The students will have a written test at the end of each phase of instruction on the assemblies. The phases are: control, feeder and delivery assembly, cylinder assembly, dampening assembly, inking assembly.

b. Ten practical exercises.

3. OFFSET PRESS TERMINOLOGY

The pressman is responsible for the press operation and he will usually be at the delivery end of the press watching the printed sheets come off the press. So the offset press is described in relation to the pressman.

a. Feeder. Since the pressman is at the delivery end of the press, he will often refer to the feeder, where the paper is being fed into the press, as the back end of the press.

b. Delivery. The delivery is where the finished printed sheets of paper are stacked by the offset press and this is where the pressman usually is located while the press is running. However, during adjustments when the pressman is at some other place at the press he may often refer to the feeder end of the offset press as the front end.

c. Gear side. One side of the offset press has the gears necessary for the press to operate. They are to the left of the pressman when he is at the delivery end of the press, so the pressman will refer to the gear side of the press as the left side as well as "gear side."

d. Operator side. One side of the offset press has the controls to operate the press. These controls are to the right of the pressman when he is at the delivery end of the press. The pressman may refer to the operator side of the press as the right side of the press as well as "operator's side."

4. OFFSET PRESS SPECIFICATIONS

a. ATF model DP. The ATF model DP offset press is the standard offset press in Army Topographic Units.

(1) Maximum paper size. The maximum paper size that will feed through the press is $22 \frac{1}{2}$ inches wide by 30 inches long.

(2) Minimum paper size. The minimum paper size that can be controlled and fed through the press is 11 inches wide by 17 inches long.

(3) Maximum image size. The maximum image size that can be printed is $22 \frac{1}{8}$ inches wide by $29 \frac{1}{2}$ inches long.

b. Harris LXC. The Harris LXC offset printing press is being phased into the military service. Eventually it will replace the ATF model DP.

(1) Maximum paper size. The maximum paper size that will feed through the Harris LXC press is 23 inches wide by 30 inches long.

(2) Minimum paper size. The minimum paper size that can be controlled and fed through the press is 9 inches wide by 12 inches long.

(3) Maximum image size. The maximum image size that can be printed is $22 \frac{5}{8}$ inches wide by $29 \frac{1}{2}$ inches long.

c. AG printing plant presses. Printing presses found in permanent installations, such as AG printing plants, are of many sizes and models. All offset printing presses operate in a similar fashion. What a student learns here will assist him in learning to operate any offset printing press that he may be assigned to operate.

d. Duplicating machines. There are several types of duplicating machines that operate on the same principle that an offset press operates. In fact, these types of duplicators can be called small offset presses. A student might be assigned to operate one. If so, the same principles that are taught here will be used on these machines. The sizes vary, usually being used to print office size stationary. The size of the duplicator will be given in the manufacturer's literature.

5. THEORY OF OFFSET PRINTING

Most all of us have seen oil floating on rain water in the roads. Offset printing takes advantage of this ability of water and grease to repel each other. The offset press has a dampening or water assembly and also an inking assembly. Ink is made with a greasy base. The water is used to keep the non-printing areas clean and the ink is placed on the image to print on the paper. Both are rolled on the plate during the printing cycle.

6. OPERATION OF THE OFFSET PRESS

a. Inking system. The purpose of the inking system is to take the ink from the fountain and move it through a roller system and deposit the ink in a thin, even film onto the image of the plate. The rollers tend to break up the ink particles and to spread the ink out in the necessary thin film required for printing.

b. Dampening system. The dampening system maintains a supply of dampening solution, usually water with various chemicals added, to keep the non-printing area of the plate wet. This repels the ink. The dampening assembly must be put against the plate before the inking assembly to keep the plate clean.

c. Plate cylinder. The plate cylinder is the top cylinder. When the press is in operation, the plate cylinder is in contact with the dampening assembly, the inking assembly and the blanket cylinder.

d. Blanket cylinder. The blanket cylinder is the only cylinder that moves to contact the other cylinders. During the printing cycle, the blanket cylinder is in contact with the plate

cylinder and the impression cylinder.

e. Impression cylinder. The impression cylinder is the bottom cylinder and is in contact with the blanket cylinder during the printing cycle. This cylinder is adjustable for pressure against the blanket cylinder. The paper is held on this cylinder during the printing cycle.

f. Paper leaves feeder. During the printing cycle, the paper leaves the feeder and travels down the feed board to be picked up by the impression cylinder. All these cylinders and rollers are in place for normal operation and are rotating.

g. Paper held to impression cylinder. As the impression cylinder rotates, it will pick up the paper and carry the paper around under the blanket cylinder to receive the image.

h. Plate rotates under dampeners. To begin the printing cycle, the dampeners are moved up to the plate. As the plate cylinder rotates under the dampener rollers, it will pick up the dampening solution on the metal surface of the plate. This will prevent ink from sticking to the metal plate and eliminate the scum. The dampening solution will not affect the coated, or printing image surface of the plate.

i. Plate rotates under inkers. After the plate has become thoroughly dampened, and with the press running, the ink rollers are dropped to the plate. The ink on the rollers will then transfer to the image on the plate and will be repelled by the dampening solution on the metal surface of the plate, which is the non-printing area. Thus, the principle of water repelling grease comes into use for offset printing. The ink rollers must be lifted from the plate before the press is stopped or the dampener rollers are lifted from the plate. Otherwise the ink will cover the entire plate surface.

j. Plate rotates against blanket. As the press runs, the plate cylinder will rotate around until it comes into contact with the blanket cylinder. The greasy ink on the plate image will transfer, or offset, on the the rubber blanket.

k. Blanket rotates against paper. The blanket cylinder will continue to rotate around and will come into contact with the paper on the impression cylinder. The greasy ink on the blanket image will then transfer, or offset, onto the paper. This is how we get the term "Offset Printing."

l. Paper moves to delivery board. As the press continues to run, the skeleton cylinder will pick up the paper from the

impression cylinder and will transfer the paper to the delivery chain which in turn drops the paper onto the delivery board.

m. Cycle repeats itself. This is a continuous cycle. Each time a sheet of paper goes into the press, the cylinders make a revolution.

7. SAFETY

A student who proves himself to be accident prone will be released from this course. All types of equipment and machinery are dangerous when operated by a careless person. A student will be graded on observing the safety rules while he is operating the equipment. If a student should see anything that ~~could~~ be a safety hazard, he should call it to the attention of an instructor. This is especially important in case of faulty equipment.

a. No loose clothing. Loose shirts, jackets or ties will not be worn around the equipment. Shirts or jackets will have short sleeves and will be tucked into the trousers. Trousers will be tucked into the boots.

b. T-shirts. The regulation T-shirt will be worn by all male students working on the equipment. Jackets or shirts will be hung in the clothing racks. Students will not leave the building wearing a T-shirt as an outer garment.

c. No jewelry. Students will remove all rings, necklaces, and watches before working on the equipment. The safety factor involved overrides any sentimental or religious factors that pertain to jewelry or medallions. In addition to possible injury to students, jewelry dropped into the equipment will damage the equipment.

d. No tools, rags or equipment on presses. After students have finished adjusting the equipment, remove all tools, rags, or anything else that have been used on the press. Put these items in the rack or drawer. Keep the rags in the cans. The vibration of the equipment will often shake loose items down into the gears or other moving parts.

e. No trash on press or floor. Keep all trash off the presses and floor. This means that all paper, rags, cans and other excess materials are put into the trash can immediately. If the press does not print a sheet of paper properly, do not throw that piece of paper on the floor. Put it into the trash can. Used rags will be put into the rag container.

f. Oil and grease wiped up. One of the greatest causes of slips and falls is grease or oil on the floor. It is a safety violation to allow grease or oil to remain on the floor by the press. A student will lose five points on each violation on each graded exercise in addition to getting reprimanded. When going to work on a press, first check for slippery floors. Clean up after servicing the press. Keep constant check on the condition of the floor near the press. Keep the floor clean.

g. Press controls on "safe" when stopped. Whenever the press is stopped students must put the electrical switches on "safe." The student who stops the press must do this and in case of the pressman, he is the one who will give the O. K. to start the press. If the press helper stops the press, he will put the safe on and will notify the pressman of the problem. The press will not be started again until the pressman gives the O. K. The press must be ready to run and all personnel clear of the press.

h. Warning before starting press. Before anyone starts any equipment, they will call out in a loud clear voice - CLEAR. They will also look to see that all personnel are out of danger. Then, and only then, will the equipment be started. This rule applies when operating the equipment by hand or with power. A gear will crush a hand just as surely when turning a press over manually as it will when turning on the power. Check the equipment to make sure that it is ready to operate before applying power. It is a safety violation to start without calling -CLEAR.

i. No adjustments on running presses. All adjustments necessary can be made when the press is not running. If a student experiences trouble, he should call an instructor. It is better to stop a press, and lose time, than it is to sustain an injury.

j. No cleaning on running presses. The presses are washed up with a wash-up device attached to the press. Students may squirt solvent on the rollers while the press is running. Keep hands and rags off the press. The press is wiped down after it has been stopped.

k. Keep hands off running equipment. Do not lean on operating equipment. Keep hands off operating equipment. A student might slip or be pushed into a moving part. If a student slips or falls, he should not grab for operating equipment.

l. Wash chemicals off hands. Keep the hands and body clean. Wash after mixing chemicals. Try to keep hands clean to handle the paper. Some chemicals cause a rash. If a student notices a rash on his hands or arms he should wash often, use a protective ointment or wear rubber gloves when washing the press

or mixing and using chemicals.

m. No horse play. Horse play of any kind will not be tolerated at any time or at any place in the school. Injuries have been caused by horse play. In some cases such action is embarrassing. Students lose points on their grade in case they try any horse play. In addition, they will be reprimanded.

n. No smoking. Smoking is not permitted in the press room. Smoke in the break area, put the cigarette stubs in the BUTT CAN. Put candy wrappers in the trash cans. Smoking in the class room is not permitted.

o. No running. Running is not permitted at any time in the school area. Walk carefully.

p. Report all accidents and injuries. Students are working around dirty equipment. Some of the things handled have been chemically treated. If a student has an accident or gets cut, he should report it immediately to the instructor so that the student can be treated. Better a "bandage" than a missing finger.

q. When in doubt, stop and ask the instructor. This rule applies all the time. If students do not understand or something happens that they can not figure out, STOP. They should call an instructor. We have saved hundreds of dollars and much time by the students detecting faulty equipment.

SUMMARY

The entire purpose of this course is to train the student to be a competent offset pressman. The instructors can not do this without the students attention and cooperation. Students now know in what sequence the press is taught. This will assist him to study ahead. At this time students should know press terminology and press specifications. And they have been told about the theory and operation of the offset press. Safety rules have been explained and they should now be ready to go out on the floor and perform the job of a pressman.

LESSON PLAN

OPERATION OF PAPER CUTTER
740-303-A-010-030

OFFSET PRINTING



April 1974

DEFENSE MAPPING SCHOOL — FORT BELVOIR, VIRGINIA

T.043-8J-LP-002

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740-303-A-010-030

ORIENTATION SHEET

OFFSET PRINTING

SEGMENTBLOCKSLESSON

PRESS
FUNDAMENTALS
 (104 Hours)

COURSE INTRODUCTION
 (14 Hours)

Introduction to
 Photolithography
 (1 Hour)

Introduction to
 Offset Printing
 Course
 (1 Hour)

OPERATION OF
PAPER CUTTER
 (1 Hour)

Operators
 Maintenance
 (11 Hours)

Major Assemblies of
 the Offset Press
 (90 Hours)

Offset Press
 Operating Procedure
 (172 Hours)

LESSON REQUIREMENTS SHEET

COURSE: Offset Printing

LESSON: Operation of Paper Cutter

OBJECTIVE: Provided with a power paper cutter, given safety and operational instructions, a work order and stock, the student will make various settings and operate the controls to cut paper according to work order specifications. This operation must be accomplished while practicing 100% safety performance at all times, and stock cut for specific job as described on the work order.

TIME: 1 Hour: 1D

TRAINING AIDS AND DEVICES:

1. Audio-Visual Aids or Devices: None
2. DA Training Aids: None
3. Service Training Aids: None

MATERIALS AND SUPPLIES:

- | | |
|---------------|-------------|
| 1. Map Stock | As required |
| 2. Wood block | One each |

EQUIPMENT: None

TRAINING AREA:

Indoor: Pressroom practical exercise area equipped with one paper cutter.

Outdoor: None

TRANSPORTATION REQUIREMENTS: None

ADDITIONAL PERSONNEL AND DEMONSTRATION TROOPS: None

TEXT REFERENCES:

1. Instructor References: Harris-Seybold Manufacturer's Manual, Papercutter, (complete)
TM 5-245 (7-70) Offset Photolithography and Map Reproduction, Chap 9, Sec II.
2. Student References: TM 5-245 (7-70) Offset Photolithography and Map Reproduction, Chap 9, Sec II.
3. Average Student Homework Time: None

LESSON OUTLINE

LESSON: Operation of Paper Cutter

TIME	SUBJECT MATTER OUTLINE	INSTRUCTIONAL TACTICS
	<u>INTRODUCTION</u>	
00:00	During the INTRODUCTION TO OFFSET PRESS OPERATION you learned that the press would run various sizes of paper. During the offset press course you will be required to cut your own paper for each job requirement. In this lesson you will learn to operate the paper cutter to an accuracy of 1/32 of an inch; 100% safety performance must be observed at all times. Because of its accuracy and capacity for work the paper cutter is one of the greatest labor saving machines in the printing field. Like any other piece of equipment the cutter must be properly operated and maintained. Improper use or lack of care will cause the cutter to be a serious safety hazard and possibly result in damage to the cutter itself. <u>SAFETY FIRST</u> is not just another slogan, when it comes to paper cutters; safety must be practiced at all times. If operated improperly your hands or arms can be cut off just as easily as if cutting through paper. Let us all practice <u>SAFETY FIRST</u>. Before the completion of this lesson, you will have actually cut 500 sheets of paper and will throughout the course under strict supervision of an instructor cut your own paper to be used on your press. During the demonstration look for the answers to the following questions: 1. What is the maximum amount of paper you can cut at one time?	Instructor: will show a piece of a 2" x 4" board and explain that the cutter has the capability of cutting the board in half with only one cut. List key questions so students can see them throughout demonstration.

TIME	SUBJECT MATTER OUTLINE	INSTRUCTIONAL TACTICS
	2. What is the function of the foot treadle? 3. How can a dull knife be made to cut easier?	45
	<u>DEVELOPMENT</u>	
00:30	1. SAFETY CHECK a. Foreign objects b. All parts operational	While demonstrating a thorough safety check, explain to the students the need for a safety check and the specific areas a safety check should cover. Ask questions to check student understanding.
00:06	2. SAFETY PROCEDURES a. Proper location of hands and feet b. No horse play or distractions	Explain and demonstrate the correct location for hands and feet during the cutting cycle and the necessity for extreme caution around the cutter. Check student understanding.
00:09	3. OPERATION OF CONTROLS a. Back gauge wheel and lock b. Drive motor c. Foot treadle d. Safety handle e. Knife lever	Identify and explain the use of the various controls. Demonstrate how each functions in the operation of the cutter. Check student understanding.
00:16	4. PREPARATION OF CUTTER FOR OPERATION a. Adjust back gauge for desired size b. Paper handling	Set the back gauge for the desired stock size. Explain and demonstrate handling of paper so that it can be easily carried. Stress carrying in small lifts until the student is more
	2	
	6	

46

TIME

SUBJECT MATTER OUTLINE

INSTRUCTIONAL TACTICS

00:25

5. CUTTING STOCK

- a. Depress foot treadle
- b. Raise safety handle
- c. Lower knife lever

familiar with handling the paper. Also explain and demonstrate winding and jogging stock on the paper cutter.

Check student understanding by asking questions.

Explain and demonstrate the proper sequence for cutting a lift of stock.

Emphasize safety throughout the cutting procedures.

Ask questions to check students understanding.

6. CRITIQUE

- a. Repose key questions
- b. Clarify misconceptions

00:33

(QUESTIONS AND COMMENTS PERIOD)

APPLICATION

Students, under the supervision of the instructor, will cut 500 sheets of stock. Students will also operate the cutter under the supervision of an instructor during printing exercises to prepare stock for their press runs.

Stress safety during the exercise.

Student understanding was checked throughout the lesson by instructor (See Instructional Tactics)

3

7

TIME	SUBJECT MATTER OUTLINE	INSTRUCTIONAL TACTICS
	<u>SUMMARY</u>	
00:48	During this hour of instruction you have observed a demonstration of the proper method of operating the paper cutter and actually cut 500 sheets of paper. The safety checks and procedures are of prime importance and must always be observed. The safety factors will constantly be drilled into you throughout the remainder of the course. You have seen how each of the controls operate and their function in the paper cutting cycle. The correct method of carrying paper and also winding and jogging paper was explained and demonstrated. The cutting of stock should be so well learned that it may seem to be routine; however, do not get lulled into a false sense of security. The paper cutter is only as dangerous as the man who is operating it. You will be required to cut the stock for each job that you print. Your next lesson will be on OPERATOR'S MAINTENANCE, which is the preliminary step in operating a press.	47
	4 8	

INSTRUCTOR NOTES

1. SAFETY CHECK

- a. Historical data: None
- b. Anecdotes: None
- c. Content: Instructor will explain the importance for working a visual safety check prior to the operation.
- d. Tactics: This teaching point could effectively be shown on CCTV showing a demonstration of a safety check in which a narrator would be explaining exactly what the demonstrator is doing and why.

2. SAFETY PROCEDURES

- a. Historical data: None
- b. Anecdotes: It has been said that the paper cutter is a giant fingernail clipper. There are people today that would not care to laugh at such a statement because of a repeating paper cutter or an unsafe act on their part has actually caused the loss of their fingers and even their hands.
- c. Content: Instructor will demonstrate the safety procedures pertaining to the location of the hands during the operations.
- d. Tactics: None

3. OPERATION OF CONTROLS

- a. Historical data: None
- b. Anecdotes: None
- c. Content: Instructor will demonstrate and explain the operational function of the controls.
- d. Tactics: This topic could be presented on CCTV using a demonstration to identify, explain and demonstrate the use of the controls.

4. PREPARATION OF CUTTER FOR OPERATION

49

- a. Historical data: None
- b. Anecdotes: Paper is sometimes received from the manufacturer with uneven edges. Because the paper was not properly winded and jogged it caused misregister of the printed image and scrapping the job was the end result.
- c. Content: Instructor will prepare the cutting adjustment and demonstrate what is considered a lift of paper.
- d. Tactics: This lesson could be taught by using the programmed text TH40-102.

5. CUTTING STOCK

- a. Historical data: None
- b. Anecdotes: None
- c. Content: Instructor will demonstrate the proper procedure of of cutting stock stressing safety through out the lesson.
- d. Tactics: None

6. EXPLANATION: This lesson was last systems engineered 13 Feb 69.

STUDENT ADVANCE SHEET

LESSON: Operation of Paper Cutter

OBJECTIVE: Provided with a power paper cutter, given safety and operational instructions, a work order and stock, the student will make various settings and operate the controls to cut paper according to work order specifications. This operation must be accomplished while practicing 100% safety performance at all times, and stock cut for specific job as described on the work order.

STUDY REFERENCES: The following are reading assignments to be accomplished during the operation of paper cutter

TM 5-245, (July 1970), Offset Photolithography and Map Reproduction
Chap A. Section II.

SUPPLEMENTARY INFORMATION: The instruction for operation of paper cutter will be accomplished in the following sequence:

1. Demonstration. (1 Hour)

- a. Safety check.
- b. Safety procedure.
- c. Operation of controls.
- d. Preparation of cutting operation.
- e. Cutting stock.

2. Student Practical Exercise (1 Hour) This exercise is not only designed to give the student sufficient practice on the paper cutter but also to allow the student to cut his own stock that he will use during Control, Feeder and Delivery Assemblies, Practice Printing I, Printing of a three color map, Printing of a five color map and Bindery and Practice Print II.

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STUDENT PRACTICAL EXERCISE

LESSON: Operation of Paper Cutter

OBJECTIVE: Provided with a power paper cutter, given safety and operation instructions, a work order and stock, the student will make various settings and operate the controls to cut paper according to work order specifications. This operation must be accomplished while practicing 100% safety performance at all times, and stock cut for specific job as described on the work order.

NOTE TO INSTRUCTOR:

Students will operate the paper cutter whenever it becomes necessary to prepare stock for a press run. This will be accomplished only under the close supervision of an instructor.

MATERIALS AND SUPPLIES REQUIRED:

1. Map stock - as required
2. Wood block - one each

EQUIPMENT: None

FACILITIES REQUIRED:

Press room practical exercise area equipped with one paper cutter.

TRANSPORTATION REQUIREMENTS: None

ADDITIONAL PERSONNEL: None

STUDENT REQUIREMENTS:

1. Operate the cutter only while an instructor is present.
2. Make a safety check to insure all moving parts are clear of obstacles, especially the cutter bed.
3. Turn on the cutter or insure it was left on by previous operator.
4. Set and lock back gauge for desired size.
5. Wind, jog and load stock on the cutter bed using lifts that can best be handled by the individual.
6. The paper cutter will be operated by only one person who will insure the cutter is clear of all other personnel.
7. Operate foot treadle, safety handle and knife lever in proper sequence to cut the paper.
8. The student will be required to cut stock to proper size for each of the following exercises: Control, Feeder and Delivery Assemblies, Practice Printing I, Printing of a Three Color Map, Printing of a Five Color Map and Bindery and Practice Printing II.
9. The student will practice 100% safety procedures at all times.

SOURCE MATERIALS

LESSON: Operation of Paper Cutter

1. Safety Check - TM 5-245
 - a. Paragraph 9-4 (b)
 - b. Paragraph 9-4 (a)
2. Safety Procedures - TM 5-245
 - a. Paragraph 9-4 (a)
 - b. Paragraph 9-4 (a) (b)
3. Operation of Controls - TM 5-245
 - a. Paragraph 9-6 (c)
 - b. Paragraph 9-6 (a)
 - c. Paragraph 9-6 (d)
 - d. Paragraph 9-6 (b)
 - e. Paragraph 9-6 (b)
4. Preparation of Cutter for Operation - TM 5-245
 - a. Paragraph 9-6 (c)
 - b. Paragraph 9-7 (a)
5. Cutting Stock - TM 5-245
 - a. Paragraph 9-6 (d)
 - b. Paragraph 9-6 (b)
 - c. Paragraph 9-6 (b)

L/74

83F20-B-010-030

PROGRAMMED LESSON
OFFSET PRINTING COURSE

OPERATION OF THE
POWER PAPER CUTTER



SEPTEMBER 1974

DEFENSE MAPPING SCHOOL — FORT BELVOIR, VIRGINIA

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INTRODUCTION

In this program you have the opportunity to learn the correct procedure of operating the electrical controls, jogging and positioning of the stock on the cutter bed, making various cuts according to the work request.

We must always keep in mind that the operation of this piece of equipment is very safe if operated according to the procedure taught. Any deviation from this procedure could result in damage to the machine or permanent injury to the operator.

LESSON OBJECTIVE

Upon successful completion of this lesson you will be able to perform the following tasks:

1. Operate the operational controls
2. Jog stock and position it correctly on the cutter bed
3. Operate the cutter following prescribed procedures
4. Follow all safety procedures taught

All make-ready and operational procedures will be accomplished according with the standards set forth in TM 5-245.

INSTRUCTIONS TO STUDENTS

This programmed lesson presents the material in small, sequential steps called frames. Read carefully each frame, then provide the required response. After responding, turn the page and check (do not merely copy) the accuracy of your response. If your initial response was correct, go on to the next frame. If your initial response was incorrect, re-read the frame before continuing. Beginning on page 1, follow the top level of frames to page 23; then return to page 1 and begin the bottom level, continuing in this manner until all the frames have been completed.

Remember, this lesson is not a test and will not be graded as such. The self-test at the end of the lesson is provided for your benefit. It offers a means whereby you can measure how well you learned the material presented in this text.

Now begin with Frame 1 at the top of page 1.

FRAME #1

The operation of the power paper cutter plays a very important function in the production of printed materials. It is the responsibility of the operator to insure that the cutter is in operational condition at all times. To accomplish this he must perform his scheduled maintenance using only the materials specified in the TM or manufacturer's manuals. When the cutter is not in use a light coat of oil should be applied to the cutter bed to prevent rust. It is the _____ responsibility to keep the cutter in operational condition at all times.

FRAME #13

To operate the cutter correctly both hands must be on the _____ simultaneously. The function of the locking lever is to lock the _____ in position prior to making a cut.

FRAME #24

To increase the efficiency and quality of paper cutting a distance of about _____ inches should be maintained between the top of the paper and the bottom of the _____. Continued heavy jogging against the back gauge will automatically throw it out of alignment causing variations in paper sizes.

57

operator's

levers, hand wheel

1½, clamp

FRAME #2

It is recommended that a _____ of oil be applied to the cutter bed when not in operation.

FRAME #14

When the knife lever is depressed it will engage the clutch (not visible) which in turn starts the knife (Photo #1, Item 6, Page 29) in its downward motion. The paper cutter is designed so that the safety lever must be raised before the knife lever can be depressed. This operation eliminates the possibility of having a hand in the position of the downward travel of the knife during the operation of the cutter. The knife lever is located under the _____ on the _____ side of the hand wheel.

FRAME #25

When loading the stock and to insure proper alignment and position of the paper, prior to the cutting operation, use a rectangular _____ of _____ to tap the edges of the stock. To allow the operator to make three different cuts at one time, the back gauge (Photo #2, Item 1, Page 30) is designed so that it can be adjusted into three separate sections.

59

light coat

table, right

block, wood

FRAME #3

Prior to the operation of the paper cutter a visual inspection is made to insure that no tools, equipment or foreign matter is positioned on the cutter bed or in the vicinity of the operational area which might cause damage to the cutter or injury to the operator. Before operating the cutter a _____ inspection must be made to insure safe operation.

FRAME #15

The knife lever when depressed engages the _____ which starts the _____ in its downward motion. To prevent the top sheet from moving during the cutting cycle a clamping device (Photo #1, Item 11; Page 29) descends ahead of the knife and comes in contact with the paper. The clamping device is activated by depressing the foot treadle which is located to the lower left front of the cutter (Photo #1, Item 5, Page 29).

FRAME #26

The back gauge of the paper cutter will absorb only a certain degree of heavy jogging; continued heavy jogging will cause it to go out of _____ and cause _____ in paper size. Before starting the cutting operation allow the knife approximately _____ inches of travel, before it comes into contact with the stock.

61

visual

clutch, knife

alignment, variations, $1\frac{1}{2}$

FRAME #14

The Seybold paper cutter has a start and stop electrical button control station located on the upper right of the frame (Photo #1, Item 8, Page 29). When the start button is pushed in, it activates the drive motor. When the stop button is pushed in it will stop the operation of the drive motor. The Seybold paper cutter is equipped with a _____ and _____ electrical button control station that operates the drive motor.

FRAME #16

To keep the top sheets in position during the cutting cycle, depress the _____ which will move the _____ in contact with the paper. Improper use of the cutter is dangerous to both the operator and the cutter. Only one operator will operate the cutter at a time.

FRAME #27

Large sheets are loaded onto the cutting table in _____ stacks called _____. A long square strip of either hardwood or plastic called a cutting stick (Photo #1, Item 13, Page 29) fits into a groove located on the cutter table directly under the knife. When the knife completes its downward travel it comes in contact with the stick with only a "kissing" contact which allows the knife to completely cut through the stock.

63

start, stop

foot treadle, clamp

small, lifts

FRAME #5

When preparing to operate the cutter, push the start electrical control button to start the drive motor. Caution: Allow the flywheel (Photo #1, Item 12, Page 29) enough time to reach its operational speed before cutting any stock. The paper cutter is equipped with a _____ and _____ electrical control button which operates the drive motor.

FRAME #17

SAFETY must be practiced at all times when operating the cutter. To prevent accidents allow only _____ operator to use the cutter at any one time. The most important single safety feature of the cutter is the safety lever, which has to be _____ prior to the operation of the knife lever.

FRAME #28

The cutting stick is located in such a position that the _____ comes in contact with a "kissing" contact on the completion of the _____ stroke. With continued use the cutting stick will become worn beyond use. This will cause the knife not to make clean cuts completely through the paper. When this occurs the cutting stick can be turned to another side or replaced. Once it has been completely rotated on all four sides continued use of a worn stick will dull the knife.

65

start, stop

one, raised

knife, downward

FRAME #6

Always allow the flywheel a little time to reach its _____ before starting to operate the cutter. Located directly under the drive motor control button is an electrical control station which has a start and stop switch. For easy viewing while setting the back gauge, the on switch is engaged to illuminate the dial indicator which is located in the upper center area of the frame (Photo #1, Item 10, Page 29).

FRAME #18

A very important safety feature of this cutter is that both hands have to be in operation at the same time. The knife lever is operated with the _____ hand while the _____ hand operates the safety lever.

FRAME #29

To eliminate the possibility of the knife not making clean cuts through the stock after a new knife has been installed, it is recommended an inspection of the _____ be made. Prior to operating the cutter a visual inspection of the cutter bed area must be made to insure that all foreign matter has been removed. Failure to do so could result in damage to the knife and/or injury to the operator.

67

operational speed

right, left

cutting stick

FRAME #7

To correctly position the back gauge for a cut, use the measurement on the dial indicator (Photo #1, Item 10, Page 29). This dial operates in conjunction with the hand wheel (Photo #1, Item 9, Page 29) and, to insure accurate cuts, is calibrated and synchronized with the movement of the back gauge. To insure an accurate cut, position the back gauge by using the _____ which works in conjunction with the hand wheel.

FRAME #19

Because both hands are working simultaneously, it is _____ to have your hands on the table during the operational movement of the knife. The knife lever is located on the right side under the table. The safety lever must be _____ before depressing the knife lever.

FRAME #20

A cutting stick is generally made out of _____ or _____ and must only make a _____ contact with the knife when it completes its downward stroke. A dull knife will affect the quality of the cutting and if used too long in this condition the knife may eventually become sprung.

69

dial indicator

impossible, raised

hardwood, plastic, kissing

79

FRAME #8

The hand wheel which is located below the table works in conjunction with the _____ which regulates the movement of the back gauge (Photo #1, Item 4, Page 29).

FRAME #20

To put the knife in motion you must raise the _____ lever and push down on the _____ lever simultaneously. Once the knife has completed its stroke, remove your hands from both levers; if not, the knife will start its downward motion again.

FRAME #31

To eliminate a poor quality cut of the stock, a _____ knife should never be used. If for some reason great stress is applied to a component part of the cutter, the safety washer (Photo #3, Item 1, Page 30) is designed to break. The safety washer is connected to the end of the drive shaft.

71

dial indicator

safety, knife

dull

81

FRAME #9

The reading of the dial indicator shows the distance between the back gauge and the knife (Photo #1, Item 6, Page 29) or the width or length of the cut. To shorten the distance between the back gauge and the knife, rotate the hand wheel in a counterclockwise direction. To lengthen the distance, rotate the hand wheel in a clockwise direction. The width or length of the cut is determined by the distance between the _____ and the _____.

FRAME #21

To prevent the knife from continuous operation _____ your hands from the _____. Large sheets to be loaded on the cutter table should be taken in small stacks, called lifts. These lifts are approximately 3" thick and each lift is jogged against the back gauge and toward the left side of the cutter table for alignment.

FRAME #32

If for some reason, great stress is applied to one of the component parts of the cutter, the _____ will break. Some reasons for this breakage would be a dull knife, a grabbing clutch, excessive clamping pressure and/or excessive cutting loads.

73

back gauge, knife

remove, levers

safety washer

S3

FRAME #10

To shorten the distance between the back gauge and knife, rotate the hand wheel in a _____ direction. The dial indicator and _____ work together when operating the back gauge.

FRAME #22

A good size lift of paper is approximately _____ inches. There is generally a smooth rectangular block of wood with the cutter, which is used to tap the exposed edges of the lift to put it into position for cutting. The most important safety feature of the cutter is that _____ hands must be working _____ during cutting operations.

FRAME #33

If the knife does not have sufficient space between the stock and the clamp to permit the knife to gain full momentum during the cutting operation, it will cause an excessive cutting load which in turn will bring stress on the _____ and cause it to _____ under certain circumstances. To help a dull knife cut easier apply a light coat of wax or soap along the beveled edge. It is not recommended to do this to a sharp knife.

75

counterclockwise, hand wheel

3", both, simultaneously

safety washer, break

85

20

FRAME #11

To prevent the back gauge from moving after it has been set in the desired position, a locking lever (Photo #1, Item 7, Page 29) is moved toward the right to secure the hand wheel in position. This device is located under and to the left of the hand wheel. To make a larger cut, rotate the hand wheel in a _____ direction.

FRAME #23

To insure good registration, correct jogging procedures must be followed. Position the stock to be cut against the back _____ and to the _____ side of the cutter bed. When loading the stock on the cutter bed allow approximately $1\frac{1}{2}$ inches between the top sheet of stock and the bottom of the hold down clamp. This space allows the knife to gain its full momentum before making the cut.

FRAME #34

If a dull knife is not cutting, a light coating of _____ or _____ along the _____ edge might alleviate the problem, until a new knife is installed.

77

clockwise

gauge, left

(Return to page 1 and continue with Level C)

wax, soap, beveled

You have completed the program frames; now turn to page 28 and complete the self-test.

FRAME #12

The locking lever, located under and to the left of the hand wheel, is used to lock the _____ into position. The paper cutter is designed with a safety lever which is located to the left of the hand wheel (Photo #1, Item 2, Page 29) and a knife lever located to the right of the hand wheel (Photo #1, Item 3, Page 29). The safety lever must be lifted with the left hand prior to depressing the knife lever with the right hand.

79

hand wheel

(Return to page 1 and continue with Level B)

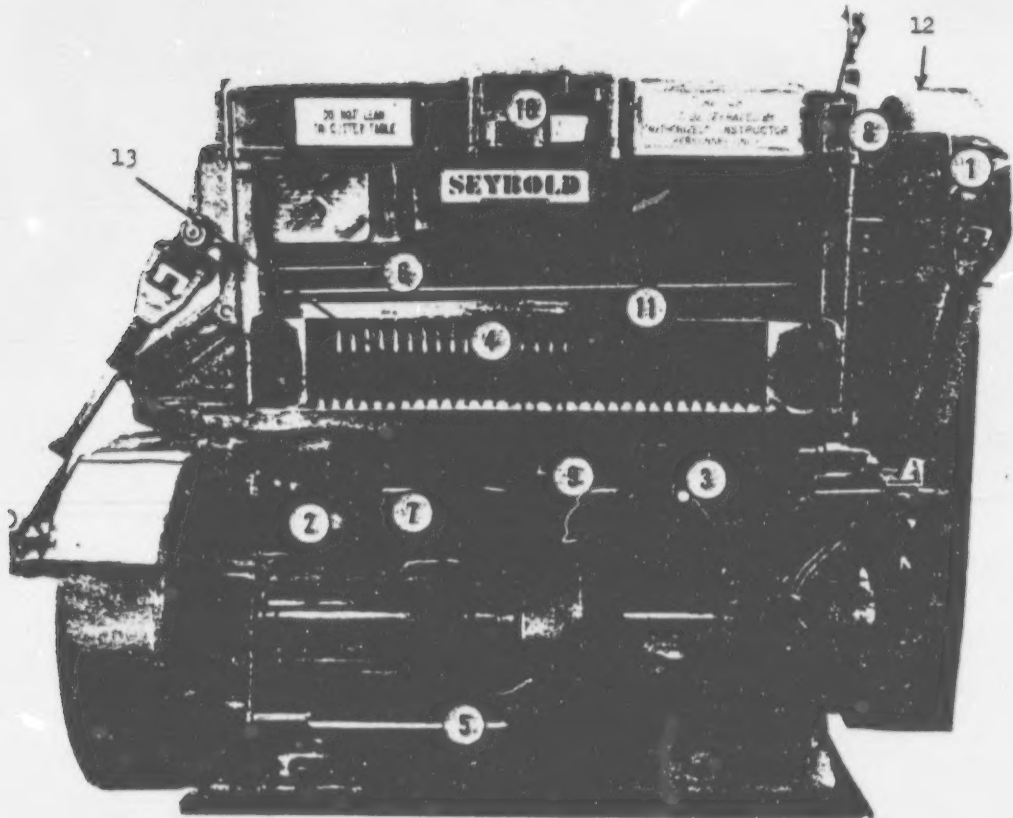
89

SELF-TEST

The following questions are provided to give you practice in using the information you learned from this text. You should be able to answer all questions correctly, but if you miss any, re-read the frame in which the answer to the question is found. The correct frames are indicated by the numbers in parentheses.

1. What is the purpose of the dial indicator? (6) (7) (8)
2. What determines the width or length of the cut? (9)
3. What purpose does the locking lever serve? (11)
4. What is the function of the foot treadle? (15) (16)
5. How many hands must be used when operating the cutter? (18)
6. The recommended distance between the stock and clamp is? (23) (24)
7. What item is used to tap the edges of the paper into position? (25)
8. What part of the cutter will break when great stress is applied? (31) (32)

PHOTO #1



- 1. DRIVE MOTOR
- 2. SAFETY LEVER
- 3. KNIFE LEVER
- 4. BACK GAUGE

- 5. FOOT TREADLE
- 6. KNIFE
- 7. LOCK LEVER
- 8. CONTROLS

- 9. HAND WHEEL
- 10. DIAL
- 11. CLAMP
- 12. FLYWHEEL (NOT VISIBLE)
- 13. CUTTER STICK

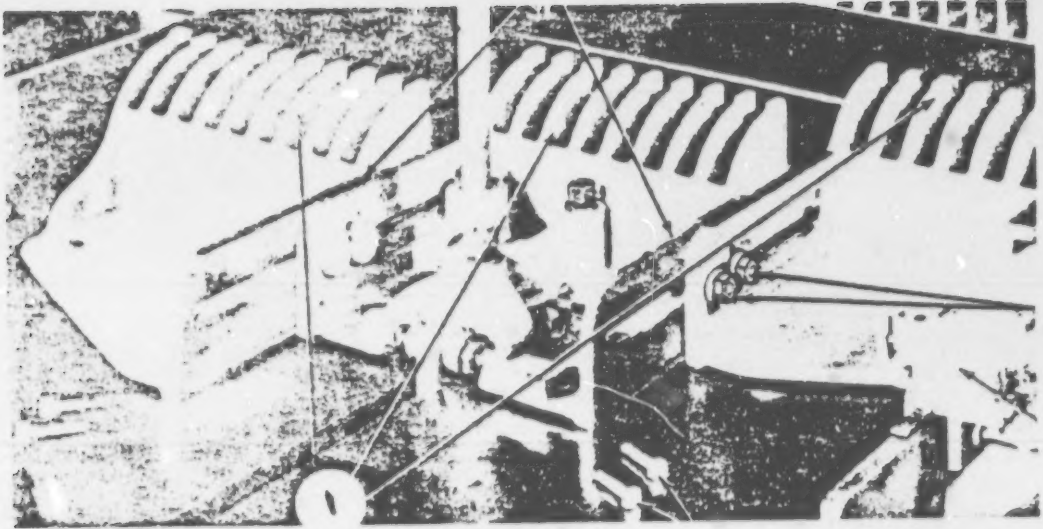


PHOTO #2

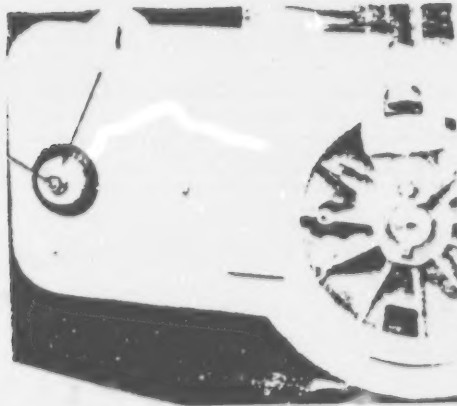


PHOTO #3

LESSON PLAN

OPERATOR'S MAINTENANCE
740-303-A-010-040

OFFSET PRINTING



DEFENSE MAPPING SCHOOL — FORT BELVOIR, VIRGINIA

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This publication supercedes Lesson Plan 740-303-A-010-040, Oct 74,
Operator's Maintenance

11/77

LESSON REQUIREMENTS SHEET

COURSE: Offset Printing

LESSON: Operator's Maintenance

OBJECTIVE: The student will, using TM 5-245, TM 5--610-202-15 and Harris Offset Press Operator's Manual for the LXG and the L-129 BC Presses:

- a. Perform a complete safety check, lubricate and grease the following types of offset presses:
 - (1) ATF-DP Chief 29
 - (2) Harris LXG
 - (3) Harris L-129 BC
- b. Learn the color coding sequence for greasing offset presses.
- c. These tasks will be accomplished in accordance with specifications and procedures set forth in TM 5-245, TM 5-3610-202-15 and the Harris Operator's Manual for the LXG and L-129 BC presses.

TIME: 11 hours: .5C, .5D, 10.OPE

TRAINING AIDS AND DEVICES:

1. Audio-Visual Aids or Devices: Vugraph #740-303-A-010-040
2. DA Training Aids: None
3. Service Training Aids: None

STUDENT MATERIALS AND EQUIPMENT:

1. ATF-DP Chief 29 Offset Press - as required
2. Harris LXG and L-129 BC Offset Press - as required
3. Oil, SAE 10 (LXG only) - as required
4. Oil, SAE 30 - as required
5. Oil, 90-DTE-BB (ATF-DP only) - as required
6. Oil, 600 WT (Harris L-129 BC only) - as required
7. Gear tooth lubricant (high quality, LXG only) - as required
8. Grease, high quality - as required
9. Grease, short fibre - as required
10. Oil can
11. Grease gun - 1 per press
12. Rags - as required
13. DA Form 2404 - as required

SPECIAL REQUIREMENTS:

1. Training Area:

Classroom equipped with desks, chairs and chalkboard. The classroom must be large enough to accommodate 30 personnel. The Practical Exercise area must be equipped with offset presses and workbenches.

2. Assistant Instructors:

- a. Four assistant instructors to assist during demonstration.
- b. One assistant instructor per two presses, during PE 1.

TEXT REFERENCES:

1. Instructor: TM 5-245 (7-70), Offset Photolithography and Map Reproduction, Chap 8, Sec I, Para 8-3

TM 5-3610-202-15 (3-63), Operation, Organizational, Field and Depot Maintenance Manual, Printing Press, ATF-OP Model, Chap 3, Para 3-9 to 3-13, Sec II, Table V, Page 50-65

Harris Operating Manual, Models LXG & LXF Offset Presses, Sec IV, Page 9

TM 38-750 (12-69), The Army Maintenance Management System, Chap 3, Para 3-4

The Lithographers Manual, Vol II, Sec 12:64

Lubrication Order, Table V, Chap 3, Sec I, TM 5-3610-202-15, TM 5-6021-1 and 2

Harris Operating Manual, Model L-129 BC, Offset Press, Sec XIV and XV

2. Student: TM 5-245 (7-70), Offset Photolithography and Map Reproduction, Chap 8, Sec I, Para 8-3

Harris Operating Manual, Models LXG & LXG, Offset Press, Sec IV, Page 9

Harris Operating Manual, Model L-129 BC, Offset Press, Sec XIV and XV

LESSON OUTLINE

LESSON: Operator's Maintenance

SUBJECT MATTER OUTLINE

INSTRUCTIONAL TACTICS

INTRODUCTION

How many of you own an automobile? In order to keep your car in top operating condition, you know that proper lubrication is a must. With the offset printing press the same applies.

During this lesson, Operator's Maintenance, you will learn the proper procedure to follow when making a safety check, identifying the lubricants for the offset presses, knowing when and how they are used and how to fill out and use the Equipment Inspection and Maintenance Worksheet, DA Form 2404.

You certainly would not run your car without oil and a good pressman would not operate a press without first properly lubricating it. The press must be oiled and greased to keep it in top operating condition. Lubrication prevents excessive wear on all moving parts of the offset press.

At the end of this period of instruction, you will be able to make a proper safety check, fill out and use the DA Form 2404 and lubricate the offset press.

Prior to instruction insure that each press has a DA Form 2404. Also, assign instructors to presses for the demonstration.

NOTE TO THE INSTRUCTOR: Due to the simultaneous instruction on the three types of presses, the development of this lesson is divided into three parts: the ATF-DP press, the Harris LXG press, and the Harris L-129 8C press.

DEVELOPMENT

1. DA Form 2404, Preparation

- a. Blocks 1-3
- b. Block 5 (Date)

Hand out DA Form 2404 and pencils to each student. How Vugraph #740-303-A-010-040. Explain the proper procedure for completing a DA Form 2404 and have each student fill out the same. The instructor will write

SUBJECT MATTER OUTLINE

INSTRUCTIONAL TACTICS

- c. Block 6 (Daily)
- d. Block 7
- e. Blocks 8a & 9a
- f. Blocks 10a, b, c, d, and e

completion information for the DA Form 2404 on the chalkboard.

Ask questions to ascertain student understanding of points covered.

Divide students into small groups and assign them to a press for the purpose of viewing a demonstration on the operations of that particular offset press. When this is accomplished, guide the students to the PE Area.

2. Safety Inspection

a. Visual

- (1) Check wiring, plugs, shielding, drive belts and drive chains
- (2) Check for tampering or damage
- (3) Check gages and guards for proper operations

Demonstrate and explain the procedure for a visual and manual safety inspection. Check student understanding by asking pertinent questions.

b. Manual

(i) Lubrication

- (a) Type of oil
- (b) Area of special attention
 - 1. Spindles on all rollers
 - 2. Pressure caps on delivery chain pulleys
 - 3. Jogger blades connection arms and links
 - 4. Pile height governor connecting blocks
 - 5. Front guide shaft connecting links

The instructor will demonstrate rotating the press by the use of the hand wheel the amount of one complete revolution to determine if the press is free from binding.

Identify proper types of lubricants. Point out areas of special attention. Demonstrate proper use of oil can and rags.

SUBJECT MATTER OUTLINE

INSTRUCTIONAL TACTICS

6. Tumbler gripper shaft bearing and connecting links
7. Vacuum pumps

(2) Greasing

- (a) Type of grease
- (b) Tumble pins
- (c) Alemite fittings
- (d) Gears (clean prior to greasing)

b. Harris LXG

- (1) Oiling
- (2) Areas of special attention

- (a) Manual oil pump
- (b) Automatic oil pump
- (c) Oil level gauge
- (d) Water motion
- (e) Sheet separator
- (f) Gripper shafts
- (g) Vacuum pumps

(3) Greasing

- (a) Type of grease
- (b) Alemite fittings
- (c) Gears (clean prior to greasing)

c. Harris L-129 3C

(1) Oil

- (a) Types of oil
- (b) Areas of special attention

1. Delivery chain brush
2. Stock thickness shaft cam shaft
3. Fountain roller clutch
4. Vacuum pumps (P-30)

Identify the proper lubricant by type and weight. Point out areas of special attention. Explain importance of lubricating these areas and place particular emphasis on the oil gauges and their purpose. Demonstrate the proper use of cans and rags.

Locate and point out to the students the 17 alemite fittings that require greasing. Demonstrate proper use of grease gun.

Check student understanding by asking questions.

Identify the proper lubricants by type and weight. Point out areas of special attention. Explain importance of lubricating these areas and place particular emphasis on the oil gauges and their purpose. Demonstrate the proper use of oil cans and rags.

Check student understanding of points covered. Ask questions.

All grease fittings on this press have been supplied with color coded caps to indicate the frequency of lubrication. It is only necessary for the pressman

SUBJECT MATTER OUTLINEINSTRUCTIONAL TACTICS

5. Oil cups and holes
6. Sleeves bearings
7. Automatic and manual oil pumps

to lubricate these points at the time intervals indicated.

Check student understanding by asking questions.

(2) Greasing

- (a) Type of grease
- (b) Gears (Clean prior to greasing)
- (c) Color code

Color code - Green indicates weekly
Red indicates monthly
Yellow indicates quarterly

1. Red
2. Green
3. Yellow

- (d) Color coding grease schedule
- (e) Area of special attention

1. Spin gears
2. Feed drive gear box
3. Vibrating spools
4. Grease fitting
5. Ball and roller bearing

Check student understanding of all points covered and clarify any misconceptions.

DEMONSTRATION

Instructor will conduct Demonstration 1.

(Allow 1 hour for this demonstration.)

BREAK AT INSTRUCTOR'S DISCRETIONAPPLICATION

Tie-in to previous lesson.

Check student understanding of major points.

Students are to perform Student Practical Exercise 1.

Allow sufficient time after SPE 1 to critique the lesson.

(PE and Critique - allow 10 hours.)

SUMMARY

During this lesson you learned to perform the safety check and to lubricate the offset presses. You were shown the Equipment Inspection and Maintenance Worksheet, DA Form 2404. Remember, improper lubrication can result in a malfunction of components of the offset press and possibly cause serious damage. A mere ten minutes a day spent on this important task, lubricating the offset press, can add years of operational life to a very expensive piece of equipment, the offset press.

Your next lesson, Control, Feeder and Delivery Assemblies, will require a safety inspection and proper use of the lubrication procedures learned.

DEMONSTRATION

LESSON: Operator's Maintenance

OBJECTIVE: To demonstrate to the student the proper safety inspection and lubrication procedures of a printing press.

SUPPORT REQUIREMENTS:

1. Oil, SAE 10 (LXG only) - as required
2. Oil, SAE 30 - as required
3. Oil, 90-DTE-BB (ATF DP only) - as required
4. Oil 600 WT (Harris L-129 BC only) - as required
5. Gear tooth lubricant (high quality)(LXG only) - as required
6. Grease, high quality - as required
7. Grease, short fibre - as required
8. Oil can - as required
9. Grease gun - 1 per press
10. Rags - as required
11. DA Form 2404 - as required

SUBJECT MATTER OUTLINE

This demonstration will provide the students sufficient knowledge to perform safety inspection and to lubricate the press properly.

INSTRUCTIONAL TACTICS

Instructor will direct students' attention to their press and demonstrate to them how to lubricate their press properly.

DEVELOPMENT

1. Safety check
2. DA Form 2404
3. Lubrication

The instructor will perform a proper safety check.

The instructor will fill out the DA Form 2404.

The instructor will perform the lubrication for that press.

740-303-A-010-040
S Practical Exercise

STUDENT PRACTICAL EXERCISE

LESSON: Operator's Maintenance

OBJECTIVE: The student will complete a DA Form 2404, make a complete safety inspection and a lubrication of one of the following offset presses: ATF-DP Chief 29, Harris LXG and L-129 BC. The tasks will be performed in accordance with specifications set forth in TM 5-245, TM 5-3610-202-15, Harris LXG or L-129 BC Operator's Manual (whichever is appropriate reference).

STUDENT MATERIALS AND EQUIPMENT:

1. Offset presses - 1 per 2 students
2. Tool set, light mechanic - 1 set per press
3. Oil can - 1 per press
4. Grease gun - 1 per press
5. Oil, SAE 10 (LXG only) - as required
6. Oil, SAE 30 - as required
7. Oil, 90-DTE-BB (ATF-DP) - as required
8. Oil, 600 wt (Harris L-129 BC only) - as required
9. Gear tooth lubricant (high quality) - as required
10. Grease, short fibre (LXG only) - as required
11. Grease, high quality - as required
12. Rags - as required
13. DA Form 2404 - 1 per student

SPECIAL REQUIREMENTS:

1. One assistant instructor for each designated group of students.
2. Time required: 10 hours

STUDENT REQUIREMENTS:

1. Complete DA Form 2404
2. Perform a visual and manual safety inspection on the press after each extended absence, especially at the beginning of a shift and after breaking for meal.
3. At the beginning of a shift, the press should be lubricated before operating it.
4. Safety precautions will be observed at all times.

SOURCE MATERIALS

LESSON: Operator's Maintenance

1. DA Form, Preparation - TM 38-750

- a. Paragraphs 3-4(2)(a,b&c), Fig 3-4 & 3-5
- b. Para 3-4(2)
- c. Para 3-4(2)(e)
- d. Para 3-4(2)(f)
- e. Para 3-4(3)(g)
- f. Para 3-4(2)(h-k)

2. Safety Inspection - TM 5-245, TM 5-3610-202-15 & Harris Operator Manuals

- a. Paragraphs 8-2, TM 5-245, Chap 3, Sec II, Table VI, TM 5-3610-202-15, Pages A-D, Harris Operator Manual, LXG & L-129 BC
- b. Paragraphs 8-2, TM 5-245, Chap 3, Sec II, Table VI, TM 5-3610-202-15, Pages A-D, Harris Operator Manual, LXG & L-129 BC

3. Lubrication

- a. Paragraph 8-3, TM 5-245 & Chap 3, Sec II, Table V, TM 5-3610-202-15
- b. Paragraph 25-28, Harris Operator Manual - LXG
- c. Section XIV-XV, Paragraphs 1-5c & 1-4, Harris Operator Manual - L-129 BC

4. Instructor Notes

After the instructor has divided the students into small groups, six to eight students in a group, he will direct the assistant instructors to position each of the groups of students around the offset press. Previously assigned to them, explain and demonstrate to the students the proper procedure for making a complete safety inspection and lubrication of the ATF DP Chief 29, Harris LXG and Harris L-129 BC Offset Presses. After the demonstration is finished, the assistant instructors will guide each student through a practical exercise of the demonstration.

LESSON REFERENCE FILE

OFFSET PRESS LUBRICATION

T.440-103



OCTOBER 1969

US ARMY ENGINEER SCHOOL - FORT BELVOIR, VIRGINIA

TABLE OF CONTENTS

SECTION I	-	Lesson Support Requirements
SECTION II	-	Lesson Outline
SECTION III	-	Source Material
ANNEX A	-	Student Advance Sheet
ANNEX B	-	None
ANNEX C	-	None

NOTE: This LRF serves as the source of information for all lessons taught on this subject, though length, methods, and objectives will vary with courses. The specific length, methods and objectives will be determined by the POI and so reflect in ILPS.

This publication supersedes LRF, T.440-103A (11-67),
OFFSET PRESS LUBRICATION (Harris Model 129 FR) (LXG-FR),
and LRF, T.O1-3 (1-67), OFFSET PRESS LUBRICATION.

SECTION I
LESSON SUPPORT REQUIREMENTS

SUBJECT: Offset Press Operation
LESSON: Offset Press Lubrication

TRAINING AIDS AND DEVICES:

1. D. A. Training Aids: None
2. Service Training Aids: None

MATERIALS AND SUPPLIES:

1. Oil, engine, heavy duty OE3C and OE10
2. Grease
3. Oil can (1 per press)
4. Grease gun (1 per press)
5. Rags

EQUIPMENT: Offset presses

FACILITIES:

1. Classroom: None
2. Training Area Facilities: Offset press operation PE area.

TRANSPORTATION: None

ADDITIONAL PERSONNEL AND DEMONSTRATION TROOPS:

1. Assistant Instructor(s): One instructor for each two presses.
2. Demonstration Troops: None

TEXT REFERENCES:

1. Required References:
 - a. TM 5-245 (Sep 62), Man Reproduction.
 - b. TM 5-3610-202-15 (Mar 63), Printing Press, Offset.
 - c. Operator's Manual, Harris Offset Press, Model LXG, Harris Intertype Corporation.

2. Excerpted References:

Excerpts from the operating manual, Harris Offset Press, Model LXG are printed with the express permission of the Harris Intertype Corporation for use by military personnel.

SECTION II LESSON OUTLINES

SUBJECT: Offset Press Operation
LESSON: Offset Press Lubrication
TIME PERIOD (TOTAL): 1 Hour
TYPE OF LESSON: Demonstration
OBJECTIVE(S): To stress the importance of lubrication and provide the student with a qualified knowledge of the lubrication points and the methods used in the lubrication of the offset press.
SUPPORT REQUIREMENTS: Refer to SECTION I
STUDENTS REFERENCES: Refer to Schedule of Instruction

INTRODUCTION

CO:00

The productive life of any press will be shortened by lack of lubrication or the use of poor lubricants. Correct lubrication will reduce wear on all moving points. You would not think of running your car without oil, so it is with the offset press. It must be oiled and greased to keep it in top running condition and to prevent excessive damage to parts.

During the demonstration look for the answers to the following questions:

1. What kind of oil is used?
2. What is automatically oiled?
3. What is manually oiled?
4. What are the gauges for?
5. What kind of grease is used?
6. What are the safety precautions?

DEVELOPMENT

NOTE TO INSTRUCTOR: The students will first be introduced to the ATF Chief 29(DP) Offset Press. The instructor will give the information and assistants will point out and demonstrate each point given by the instructor.

- 00:02 1. OILING THE ATF CHIEF 29 (DP) OFFSET PRESS
- 00:03 2. PROHIBITED OIL
- 00:04 3. PLACES OF SPECIAL ATTENTION
- 00:10 4. CAMS AND ROLLERS
 - a. Suckerbars (2 cams)
 - b. Air valve
 - c. Impression mechanism
 - d. Sheet drop bar
 - e. Trip mechanism
 - f. Front guides
 - g. Water ductor roller
 - h. Ink ductor roller
 - i. Delivery gripper shafts (2 cams)
 - j. Pile height governor
- 00:22 5. CHAINS
- 00:23 6. AIR PUMP OIL RESERVOIR
- 00:25 7. VIBRATOR BLOCKS
- 00:26 8. VIBRATOR WORM AND GEAR HOUSING AND ELECTRIC MOTORS
- 00:27 9. GREASING THE ATF CHIEF 29 (DP) OFFSET PRESS
 - a. Tumbler Pins
 - b. Alemite (zerk) fittings
 - c. Gears

NOTE TO INSTRUCTOR: This completes the instruction on the ATF Chief 29 (DP) Offset Press. Make sure the students understand all the points covered, then proceed to the Harris LXG Offset Press.

- 00:30 10. OILING THE HARRIS LXG OFFSET PRESS
 - a. Oil to be used
 - b. Automatic lubrication
 - c. Hand-operated lubrication pump
 - d. Places not lubricated automatically
 - e. Pressure gauges
 - f. Gast air and vacuum pump
- 00:35 11. GREASING THE HARRIS LXG OFFSET PRESS
 - a. Alemite (zerk) fittings
 - b. Gears
 - c. Rollers
- 00:38 12. SAFETY
 - a. Jewelry

100

- b. Clothing
- c. Clean area

00:42 13. CRITIQUE

- a. Repose key questions
- b. Clarify any misconceptions

(QUESTIONS AND COMMENTS PERIOD)

SUMMARY

- 00:47
1. Oiling the ATF Chief 29 (DP) Offset Press
 2. Prohibited Oil
 3. Places of Special Attention
 4. Cams and Rollers
 5. Chains
 6. Air Pump Oil Reservoir
 7. Vibrator Blocks
 8. Vibrator Worm and Gear Housing and Electric Motors
 9. Greasing the ATF Chief 29 (DP) Offset Press
 10. Oiling the Harris LKG Offset Press
 11. Greasing the Harris LKG Offset Press
 12. Safety
 13. Tie-in to Next Class

00:50 BREAK

110

3
4

SECTION III
SOURCE MATERIAL
OFFSET PRESS LUBRICATION

INTRODUCTION

To insure that the equipment is ready for operation at all times, it must be inspected systematically before operation, during operation, at halt, and after operation, so that defects may be discovered and corrected before they result in serious damage or failure. The necessary preventive maintenance services will be performed before operation. Defects discovered during operation of the unit will be noted for future correction, to be made as soon as operation has ceased. Stop operation immediately if a deficiency is noticed during operation which would damage the equipment if operation were continued. After-operation services will be performed by the operator after every operating period. After-operation services will be performed at intervals based on the normal operations of the equipment. Reduce interval to compensate for abnormal conditions. Defects or unsatisfactory operation characteristics beyond the scope of the operator to correct must be reported at the earliest opportunity to Organizational Maintenance. Responsibility for performance of preventive maintenance services rests not only with the operator, but with the entire chain of command from section chief to commanding officer.

DEVELOPMENT

1. OILING OF THE ATF CHIEF 29 (OP) OFFSET PRESS

Every pressman should develop a routine for oiling the press and follow it daily. If for example you start at the feeder end of the press and work completely around the machine, you should be able to locate all the manual oil holes. Such a routine will help to avoid missing the oil holes and thus causing damage or reducing the working life of the press. There are approximately 150 manual oil holes located at various points about the press. Do not confuse these oil holes with Allen set-screw wells. Most of the oil holes are painted in red for easy identification, but some of them are well concealed and must be located and oiled daily. Wipe off excess oil immediately to prevent dripping on pressroom floor. Keep the floor clean and free of lubricants and solvents at all times. The oil we will be using is oil, heavy duty, engine, OE 30 or 9250.

2. PROHIBITED OIL

Do not use a dripless oil as the oil will not flow into oil holes or around cams and rollers. Do not use oil that contains graphite, soap or any foreign substance.

3. PLACES OF SPECIAL ATTENTION

- a. Spindles on all rollers.
- b. Pressure caps on delivery chain pulleys.
- c. Jogger blades connecting arms and links.
- d. Pile height governor connecting blocks.
- e. Front guide shaft connecting links.
- f. Tumbler gripper shaft bearing and connecting links.

4. CAMS AND ROLLERS

Cams and rollers must be kept free of dirt and oiled daily. The rollers must roll with the cams to prevent flat spots. They are located on the following mechanism:

- a. Suckerbars (2 cams).
- b. Air valve.
- c. Impression mechanism.
- d. Sheet drop bar.
- e. Trip mechanism.
- f. Front guides.
- g. Water ductor roller.
- h. Ink ductor roller.
- i. Delivery gripper shafts (2 cams).
- j. Pile height governor.

5. CHAINS

Chains in the delivery assembly should be oiled before the evening shutdown with a good penetrating oil or a mixture of equal parts of kerosene and SAE 20 machine oil.

6. AIR PUMP OIL RESERVOIR

Check daily and add oil when needed. When starting, the pin on top of the reservoir should be in the up or vertical position to allow oil to flow into the pump. When the run is finished, the pin should be put in the down or horizontal position to stop the flow of oil. If left in the up position overnight, oil will drain into the pump.

7. VIBRATOR BLOCKS

The ATF Chief 29 (DP) Offset Press has six fiber blocks. The inking assembly has 5 and the dampening assembly has 1. To prevent excessive wear, these blocks should be kept well oiled at all times.

8. VIBRATOR WORM AND GEAR HOUSING AND ELECTRIC MOTORS

These two units are lubricated once a month or after 250 hours of operation with 99-DTE-BB as provided with the press.

The ATF Chief 29 (DP) employs two motors: the Press Blower Motor and the Press Drive Motor, each of which is a sealed unit and requires no lubrication for the rated life of the equipment.

9. GREASING THE ATF CHIEF 29 (DP) OFFSET PRESS

a. Tumbler pins. There are two tumbler pins on the impression cylinder on the operator's side; they should be greased weekly.

b. Alamite (zerk) fittings. The ATF Chief 29 (DP) Offset Press has 29 fittings; they are greased weekly and all excess grease wiped off.

c. Gears. Before lubrication each month, gears are first cleaned until they are free of gum, powder and old grease, then new grease is added. The pinion gear, between the impression cylinder and blanket cylinder is checked daily and greased as needed.

10. OILING THE HARRIS LXG OFFSET PRESS

a. Oil to be used. Press will be oiled before the start of

the day's run. The oil used is oil, engine, heavy duty OE 30 and OE 10.

b. Automatic lubrication. The main cylinder bearings are lubricated by an automatic cylinder pump operating off the cylinder gear train. A measured amount of oil is fed to the bearings each time the press reaches a predetermined number of revolutions. The unit is equipped with an oil level gauge that should be checked daily. Use the oil specified on the lubrication specification plate mounted on the press.

c. Hand-operated lubrication pump. The remaining lubrication points, with some exceptions which will be pointed out later, are lubricated by the hand-operated pump. Actuate the pump once every eight-hour shift if operating conditions are normal. Compress the handle to the stop position and release. It should rise slowly to its original position. If the handle snaps back, the pump is empty. Refill with oil specified on the lubrication specification plate.

d. Places not lubricated automatically. Those places not lubricated automatically are the water motion, sheet separator, and gripper shafts. These parts are lubricated by hand before starting the run.

e. Pressure gauges. The two pressure gauges on the delivery end of the press will indicate that the systems have been charged. With the black needle on the zero, set the adjustable red needle to coincide. When either system is being charged, the black needle will rise and carry the red needle to indicate the amount of pressure in the lines. The pressure reading for the automatic cycling system should read 15 P.S.I. or greater, while the pressure reading for the hand pump should read 40 P.S.I. or greater.

f. Cast air and vacuum pump. Protect the pump from dirt and excessive moisture, lubricate it and it will give years of trouble-free service. DO NOT take pump apart to clean or replace the vanes until you have read the manual. Fill the oiler with light oil (or #10 SAE or equivalent petroleum base without additives) every 25 to 50 hours running time. Flush the ball bearings with a small amount of oil (ten to twenty drops) at bearing oilers every time the oiler jar is filled. The large jar is to catch dirt and waste oil. DO NOT RE-USE THIS OIL. Empty jar each time the oiler is filled. Pump temperatures of 150 to 200 degrees F. are normal when operating at 18" vacuum or 12 P.S.I. pressure. Occasionally examine shaft for side or end play. If pump or motor shows evidence of overheating or excessive noise, stop at once.

11. GREASING THE HARRIS LXG OFFSET PRESS

There is no Department of Defense lubrication order for the Harris LXG press so we use the standard army lubricants (OE 30, BR-lubricant, ball and roller bearing, GAA-grease, Automotive and Artillery, PL-S-Oil, lubricating, preservative, special).

a. Alamite (zerk) fittings. There are 17 alamite or zerk fittings on the offset press, that should be serviced every 100,000 impressions, or weekly, whichever occurs first. Clean off excess grease after servicing. Grease more often under hot or dusty conditions.

b. Gears. Clean and lubricate gears every 100,000 impressions. Grease more often under hot or dusty conditions.

c. Rollers. At the start of each shift, a small amount of lubricate should be applied to the ends of rollers not equipped with oil holes or bearings. Grease more often under dusty conditions.

12. SAFETY

Because the press contains many exposed moving parts such as rollers, gears, chains and sprockets, great care must be exercised during operation to prevent serious accidents. During lubrication of the press the following regulations should be adhered to at all times.

a. Jewelry. Remove all jewelry and rings from the hands and any dog tags or necklaces from the neck.

b. Clothing. Fatigues, jackets or shirts, if worn, will be worn inside the trousers and sleeves rolled up above the elbow.

c. Clean area. Keep the floor clean at all times. Wipe up all spilled liquids immediately.

d. Do not oil the press while it is running.

13. CRITIQUE

a. Repose key questions.

Q. What kind of oil is used?

A. Oil, engine, heavy duty OE 30 and OE 10.

Q. What is automatically oiled?

A. The main cylinder bearings.

Q. What is manually oiled?

A. The water motion, sheet separator, and gripper shafts.

Q. What are the gauges for?

A. To indicate the oil pressure.

Q. What kind of grease is used?

A. Grease, automotive and artillery.

Q. What are the safety precautions?

A. Stop press before oiling or greasing. Do not wear any type jewelry that might catch on equipment. Do not wear loose clothing. Keep area clean.

b. Clarify any misconceptions.

SUMMARY

During the presentation you saw the proper procedures to follow when oiling and greasing the press. You were also told the safety precautions to be followed when lubricating the press. Keep in mind that it is your responsibility to keep the press properly lubricated.

STUDENT ADVANCE SHEET

SUBJECT: Offset Press Operation

LESSON: Offset Press Lubrication

OBJECTIVE(S): To stress the importance of lubrication, and provide the student with a working knowledge of the lubrication points and the methods used in the lubrication of the offset press.

STUDY REFERENCES: The following reading assignments will be accomplished prior to the hour of instruction.

1. TM 5-245 (Sep 62), Map Reproduction, para 66 and 67.
2. TM 5-3610-202-15 (Mar 63), Printing Press Offset, para 3-15.
3. Operator's Manual, Harris Offset Press, Model LXG, Harris Intertype Corporation.

SUPPLEMENTARY INFORMATION: Instruction in the area of lubrication of the offset press will be accomplished in the following sequence:

1. Demonstration (One hour). Includes:
 - a. Oiling
 - b. Greasing
 - c. Safety
2. Note: For the ATF Chief 29 (DP) Offset Presses lubrication orders LO 5-6021-2 will be used to aid you in the lubrication. At this time there are no lubrication orders for the Harris LXG Offset Press.

LUBRICATION OF THE ATF CHIEF 29 DP OFFSET PRESS

PROGRAMMED LESSON

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Objectives of Lesson -----	1
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Self-Test -----	53

INTRODUCTION

In this program, you are given a general review of all points to be lubricated on the ATF Chief 29 DP Offset Press.

It is essential to operation and preservation of the press that these parts be lubricated. It is the mark of a good pressman to have a properly lubricated press.

INSTRUCTIONS TO STUDENTS

This programmed lesson presents the material in small "frames" which are followed by an incomplete "response". Study the frame until you can complete the missing portion of the response; then CHECK (do not merely copy) your answer with the correct answer which is printed at the top of the next page. If your answer does not agree, re-study the frame, or, if you need assistance, raise your hand and the instructor will aid you.

Begin with Frame #1 at the top of page 1 and continue along Level A - until directed to start Level B. At the end of Level B there is a self-test where you can check your understanding of the entire lesson.

OBJECTIVES OF THIS LESSON

Upon completion of this lesson, the student will be able to lubricate all oil holes, cams, rollers, alemite fittings, gears, vibrator blocks, tumbler pins and electric motors on the ATF Chief 29 DP Offset Press.

FRAME #1

LEVEL A

The offset press needs to be lubricated to prevent excessive wear. Excessive wear is prevented by proper _____.

FRAME #27

LEVEL B

Since the vertical position starts the flow of oil, the horizontal position must shut it off. To shut off the flow of oil we must put the valve pin in the _____ position.

110

1. lubrication

27. horizontal

120

2

FRAME #2

Some parts are lubricated with oil, others with grease. Two types of lubricants are _____ and _____.

FRAME #28

Since the valve pin has only two positions let's see if you remember what they are. In your own words state what each position does to the flow of oil.

Horizontal -

Vertical -

112

2. oil and grease

28. Horizontal position shuts off the flow of oil
Vertical position starts the flow of oil

FRAME #3

Oiling is done at the beginning of the day because oil will drain from the bearings when the press is left overnight. To maintain proper lubrication, oiling is done at what time of the day?
_____.

FRAME #29

The ATF "29" Model DP Offset Press has six fiber blocks; the inking assembly having five and the dampening assembly one. These blocks should be kept well oiled at all times. There are _____ fiber blocks on the ATF offset press.

114

3. Beginning

29. six

124

6

FRAME #4

Oiling is done at the beginning of each day to prevent _____

FRAME #30

We now know there are six fiber blocks on the ATF; the inking assembly having five and the dampening assembly one. To prevent excess wear, these blocks should be kept well _____ at all times.

116

4. excessive wear

30. oiled

126

FRAME #5

We know from experience that oil comes in different weights. If you will look at the key you will see we use OE 10 and OE 30. At what temperature do we use OE 30? _____

- KEY -

EXPECTED TEMPERATURE		
Above +32°F	+32°F to -10°F	Below -10°F
OE 30	OE 10	

FRAME #31

The ATF Model DP Offset Press has _____ fiber blocks. The inking assembly has _____ and the dampening assembly has _____. These blocks should be kept well _____ at all times.

118

5. ABOVE + 32°F

31. six, five, one, oiled

128

10

FRAME #6

119

The key tells us that OE 30 is used when the temperature is above 32° F. At what temperature is OE 10 used? _____

FRAME #32

We learned that there are six fiber blocks, let's see where they are located. The inking assembly has five and the dampening assembly one.

1. What assembly has five blocks? _____
2. What assembly has one block? _____

120 6. +32°F to -10°F

32. 1. Inking
2. Dampening

130

FRAME #7

The key tells us at what temperatures to use our oils, OE 30 at +32°F and above, OE 10 below +32°F. Did you also know there are two types of oils, drip and dripless? We use a drip type because we want it to flow freely and cover all points to be lubricated.

FRAME #33

Oil in the gear housing is changed once a year. This change is performed by a maintenance man. Lubrication of the gear housing is performed once a .

122

7. No response

33. year

132

14

FRAME #8

123

Oil that flows freely is called a _____ oil.

FRAME #34

The electric motor also falls into the once-a-year program and is maintained by maintenance men.

124 8. drip

34. no response

134

FRAME #9

125

Oil that doesn't flow freely is called a _____ oil.

FRAME #35

The lubrication of the gear housing is done once a year.
Lubrication is performed by _____.

126

9. dripless

35. maintenance men

136

FRAME #10

What are the two types of oil used on the press?

a. _____

b. _____

FRAME #36

The gear housing and electric motor fall into the same category of maintenance. Who maintains these pieces of machinery and how often is it performed?

a. _____

b. _____

128

- 10. a. Drip
- b. Dripless

- 36. a. Maintenance men
- b. Once a year

138

FRAME #11

To aid us in lubrication, the oil holes are painted red. The oil holes are painted red as an _____ in lubrication.

FRAME #37

How often are the gear housing and electric motors checked and who performs the maintenance?

- a. Every three months, by operator
- b. Every six months, by maintenance men
- c. Every nine months, by operator
- d. Every 12 months, by maintenance men

130

11. aid

37. d.

140

FRAME #12

The offset press has six places that require special attention. Special attention must be given to how many places on an offset press? _____

FRAME #38

Greasing of the ATF Chief 29 is accomplished in three areas, gears, alemite fittings and tumbler pins. Three areas of greasing on the ATF Chief 29 are _____, _____ and _____.

132

12. Six

38. gears, alemite fittings, tumbler pins

142

FRAME #13

All the places listed below require special attention. They should be checked daily. Study them carefully. They are important to proper press maintenance.

- a. Spindles on all rollers
- b. Pressure caps on delivery chain pulleys
- c. Jogger blades connecting arms and links
- d. Pile height governor connecting blocks
- e. Front guide shaft connecting links
- f. Tumbler gripper shaft bearings and connecting links

FRAME #39

Gears are to be cleaned once a month and greased. Once a month the _____ are cleaned and _____.

134 13. No response

39. gears, greased

114

FRAME #14

List three places that require special attention.

a. _____

b. _____

c. _____

FRAME #40

How often are the gears cleaned and greased?

136

14. Any three of the following:

- a. Spindles on all rollers
- b. Pressure caps on delivery chain pulleys
- c. Jogger blades connecting arms and links
- d. Pile height governor connecting blocks
- e. Front guide shaft connecting links
- f. Tumbler gripper shaft bearings and connecting links

40. Once a month

146

FRAME #15

All cams and rollers must be free of dirt and oiled daily. If they do not roll with the cam, the cam will soon become worn. Check daily the cam rollers which activate the following parts:

- a. Headstop shaft
- b. Side guide
- c. Sheet flattener bar or drop bar
- d. Dampener ductor
- e. Automatic trip mechanism
- f. Sucker bar
- g. Ink ductor

FRAME #41

Also we have a pinion gear between the impression cylinder and blanket cylinder, this gear is to be checked daily and greased when needed. The pinion gear must be checked _____ and _____ as needed.

138

15. No response

41. daily, greased

118

FRAME #16

Cams and rollers that do not roll free are usually _____
and lack _____.

FRAME #42

The ATF Chief 29 DP Offset Press has 29 alemite fittings which
are greased weekly. To properly grease the ATF Chief 29 DP Offset
Press we must find all _____ alemite fittings and grease them
_____.

140

16. dirty, oil

42. 29, weakly

150

FRAME #17

Worn cams and rollers are caused by improper _____.

FRAME #43

_____ greasing will maintain the alemite fittings on
the ATF Chief 29 DP Offset Press.

142

17. oiling

43. Weekly

152

FRAME #18

143

In order to properly maintain cams and rollers they must be free of _____ and well _____ every _____.

FRAME #44

There are two tumbler pins on the impression cylinder on the operator's side of the ATF Chief 29 DP. These pins should be greased weekly.

144

18. dirt, oiled, day

8

44. No response

154

FRAME #19

145

We have two methods of lubricating the chains of an offset press. The chains on an offset press are lubricated by _____ methods.

FRAME #45

The _____ side of the ATF Chief 29 DP contains _____ tumbler pins and they are greased _____.

146

19. two

45. operator's, two, weekly

156

FRAME #20

One method of lubricating the chains is with OE 30 heavy duty oil. One method of lubricating the chains on an offset press is with _____ heavy duty oil.

FRAME #46

The _____ tumbler pins on the impression cylinder are greased _____.

148

20. 03 31

46. two, weekly

158

40

FRAME #21

149

Another method of lubricating the chains is to mix equal parts of kerosene and penetrating oil. Equal parts of kerosene and penetrating oil make a good lubricant for lubricating the _____ of an offset press.

FRAME #47

To all student pressmen: No one person can be a policeman and prevent all accidents. It is up to each student to know the safety rules and practice them. No pressman need keep anyone on his press who will not conform to all safe practices. First aid should be obtained for all injuries, no matter how small. This serves as a guard against infection and prevents delay in healing.

150

21. chains

47. No response

160

42

FRAME #22

151

Name the two lubricants for lubricating the chains of an offset press:

a. _____

b. _____ and _____

FRAME #48

For safety reasons, during lubrication the press is stopped and all switches put on the safe position. To maintain proper safety precautions the press is _____ and all switches put on the _____ position.

152

- 22. a. OE 30
- b. Kerosene and penetrating oil

48. stopped, safe

152

44

FRAME #23

The air pump on the offset press has a small glass jar which acts as a reservoir for oil. This container is called the air pump oil reservoir. On the air pump of an offset press we have a small glass container for oil that is called the _____.

FRAME #49

Oiling the press should not be attempted unless the press is stopped. Wipe up oil from floors and platforms to reduce slipping hazards. Slipping hazards are reduced by keeping oil off the _____ and _____.

154

23. air pump oil reservoir

49. floors, platforms

164

FRAME #24

To control the flow of oil into the air pump we have a valve pin on top of the glass jar. This pin sets the flow of oil at an even rate so we don't overload the pump. The flow of oil into the air pump is controlled by a _____ pin.

FRAME #50

For safety reasons, clothing that can become caught in moving machinery should not be worn in the press room. Rolled up or short-sleeved shirts tucked in at the waist indicate safety procedures are being followed. Sleeves are rolled up and shirts are tucked in for _____ reasons.

156 24. valve

50. safety

156

The valve pin controls the flow of oil into the air pump. Let us find out what the positions are to set it. The valve pin has two positions vertical and horizontal. What are the two positions available to the pressman to set the valve pin? _____ and _____

FRAME #51

For safety reasons, dog tags, identification bracelets, watches or rings will not be worn when working around the press. What must be removed for safety reasons?

- a. _____
- b. _____
- c. _____
- d. _____

158

25. Vertical and horizontal

- 51. a. Dog tags
- b. Identification bracelets
- c. Watches
- d. Rings

168

FRAME #26

To start the flow of oil into the air pump the valve pin is put in the vertical position. In what position is the valve pin placed to begin the oil flow from the oil reservoir into the air pump? _____

FRAME #52

In order to protect the pressman from possible injury, we have mentioned a few safety hazards. In your own words, list some of these hazards.

- a.
- b.
- c.
- d.
- e.

160

26. Vertical

52. a. Make sure the press is stopped
b. Wipe up all oil on floors or platforms
c. Shirts should have rolled up or short sleeves
d. Shirts should be tucked in trousers
e. Do not wear dog tags
f. Do not wear watches
g. Do not wear rings
h. Do not wear identification bracelets

YOU HAVE COMPLETED ALL THE FRAMES IN THIS LESSON. GO TO
PAGE 53 AND COMPLETE THE SELF-TEST.

170

SELF-TEST

These self-test questions are provided to give you practice in using the information that you learned from your study of this text. The numbers in parenthesis indicate the frame in which the information needed to answer the questions correctly was discussed. Check your answers by referring to the frame numbers shown after each question. You should be able to answer all questions correctly, but if you miss any, reread the page (or frame) on which the answer to the question is found.

1. When should the press be oiled? (#3)
2. What weights of oil are used to lubricate the offset press? (#5)
3. What are the two methods of lubricating the chains on an offset press? (#20, 21)
4. What do we have to control the flow of oil into the air pump? (#24)
5. The ATF Chief 29 DP has how many fiber blocks? (#29)
6. How often is the oil changed in the gear housing? (#33)
7. Who maintains the electric motors? (#34)
8. In what position is the "on" button when lubricating the press? (#48)
9. List three safety hazards that a pressman may encounter while operating an offset press. (#51)

LESSON PLAN

PREPARE CONTROLS, FEEDER AND DELIVERY ASSEMBLIES

740-303-A-020-010

OFFSET PRINTING



DEFENSE MAPPING SCHOOL — FORT BELVOIR, VIRGINIA

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LESSON REQUIREMENTS SHEET

COURSE: Offset Printing

LESSON: Prepare Controls, Feeder and Delivery Assemblies

OBJECTIVE: Provided an offset press (LXG, L-129 BC or ATF-DP), press tool kit, paper, safety rules, TM 5-245 (Jul 70) and appropriate Harris Operator's Manual, the student will set-up and make proper adjustments to the feeder and delivery assemblies and utilize all controls necessary to successfully run 250 sheets of paper through the offset press. The student will be given a two-hour graded examination on his/her ability to correctly set-up and operate these assemblies in accordance with procedures outlined in the manuals provided. He or she must achieve a grade of 70 to successfully complete this graded exercise.

TIME: 28 Hours: 4.0D, 22.0PE, 2.0E

TRAINING AIDS AND DEVICES: #A-109-57 Schematic drawing of a typical offset press.

STUDENT MATERIALS AND EQUIPMENT:

1. Map Stock - 500 sheets per student
2. Oil can w/OE30 wt oil - 1 can per press
3. Oil 99 DTE, BB - as required (ATF-DP presses only)
4. Oil, 10 weight (Harris presses only) - as required
5. Ruler, 36 inch - 1 per press
6. Rags, wiping - as required
7. Offset Press (ATF-DP, LXG or L-129 BC) - 1 per designated group
8. Wedge, paper - 3 per press

SPECIAL REQUIREMENTS:

1. Training Area:
 - a. 30-man classroom equipped with tablet arm chairs, chalkboard and rack A-frame.
 - b. Practical exercise area equipped with one offset press and workbench for each designated group.
2. Assistant Instructors:
 - a. One assistant instructor per two presses during SPE 1 & 2

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A-1

- b. One assistant instructor per two presses during E 1
- c. Two assistant instructors for each model press during D 1

TEXT REFERENCES:

1. Instructor: TM 5-245 (7-70), Offset Photolithography and Map Reproduction, Chap 8, Sec II, III, IV.

TM 5-3610-202-15 (3-63), Printing Press Offset Cylinder-Rotary, Model DP-ATF, Chap I, Sec II, para 1-24 thru 1-54 and 1-77 thru 1-85; Chap II, Sec I, para 2-26 thru 2-48 and 2-72 thru 2-74, Chap II, Sec II, para 2-78 thru 2-115.

Harris Operating Manuals, Sec 3, 4, 5 and 6.

2. Student: TM 5-245 (7-70), Offset Photolithography and Map Reproduction, Chap 8, Sec II, III, IV.

Harris Operating Manuals, Sec 3, 4, 5 and 6.

LESSON OUTLINE

LESSON: Prepare Controls, Feeder and Delivery Assemblies (ATF-DP Press)

SUBJECT MATTER OUTLINE	INSTRUCTIONAL TACTICS
<u>INTRODUCTION</u> The instruction that you have received on Operator's Maintenance will be utilized in this lesson, Prepare Controls, Feeder and Delivery Assembly. During this lesson you will be required to oil and grease your press as per instruction set forth by the primary instructor. During this lesson you will learn the set-up procedures used for Controls, Feeder and Delivery Assemblies to include all necessary adjustments. Upon completion of this lesson you will be able to successfully prepare these assemblies by correctly winding and jogging the stock, adjusting the feeder, operating the controls for the transfer of paper, positioning and adjusting register mechanisms and adjusting the delivery to properly receive and position the paper onto the delivery board in a neat and even stack. Because failure of paper feeding properly will account for approximately 50% of a pressman's problems, it is necessary that you, a potential pressman, thoroughly understand these assemblies before proceeding to other assemblies of the press.	Use Service Training Aid #A-109-57 Schematic Drawing of an Offset Press to point out the assemblies and to show the sequence of the paper through the press. Introduction will be given in classroom, then students will be moved to PE area for development of demonstration. Inform the students they will stay in their designated groups for the demonstration.

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SUBJECT MATTER OUTLINE	INSTRUCTIONAL TACTICS
<u>DEVELOPMENT</u> <u>DEVELOPMENT #1</u> ATF-DP Offset Press 1. SHEET FEED SYSTEMS a. Single sheet feeder b. Stream fed feeder 2. CONTROLS a. Selector switch position (1) Safe (2) Jog (3) Run b. Start button c. Stop button d. Air buttons (1) On (2) Off e. Counter mechanism f. Mechanical variable speed control	NOTE TO INSTRUCTOR: Due to the simultaneous instruction of the three types of presses, the development of this lesson is divided into three parts, Development #1, which pertains to the ATF-DP press and Development #2, the Harris LXG press, and Development #3, the Harris L-129 BC Press. Explain the difference. Ask questions to check student understanding. Point out location; explain function and demonstrate. Stress safety. Ask questions to check student understanding.
	BREAK AT INSTRUCTOR'S DISCRETION
3. FEEDER ASSEMBLY a. Position sheet on the feeder board.	Have demonstrator use 500 sheets of stock, explain and demonstrate proper setup procedures.

SUBJECT MATTER OUTLINE	INSTRUCTIONAL TACTICS
b. Position L-shaped pile guide bars c. Wind, jog and load the stock d. Position and set sucker feet e. Operate the feeder board manual handle f. Position corner brackets and tail weights g. Position and set the pile height governor h. Sheet separators i. Set air blast knobs	Refer to Detailed Procedure Sheet for further information. Stress safety. Ask questions to check student understanding.
4. SHEET TRANSPORTING AND POSITIONING DEVICES a. Conveyor tapes b. Set pull-in wheels c. Adjust two sheet choke d. Move side guide e. Feeder valve handle f. Impression throw-on lever g. Set vacuum gauge h. Position sheet guards i. Sheet guides j. Front guides (head stops) k. Undertongues l. Cylinder grippers m. Adjust sheet flattener bar (drop bar) n. Position register sheets o. Position rider balls p. Adjust side guide q. Side guide changeover	Explain and demonstrate proper setup procedures. Refer to Detailed Procedure Sheet for further information. Stress safety. Ask questions to check student understanding.
5. TRIP MECHANISMS a. Automatic trip (1 ea) b. Manual trips (2 ea)	Point out, explain and demonstrate the function of the trips. Ask questions to check student understanding.
6. DELIVERY ASSEMBLY a. Gripper fingers and bars b. Skeleton cylinder c. Stripper fingers	Point out and explain all components. Demonstrate all necessary adjustments.

SUBJECT MATTER OUTLINE	INSTRUCTIONAL TACTICS
d. Sheet stops e. Delivery board f. Adjust jogger blades g. Operate manual control handle h. Automatic pile receder	Refer to Detailed Procedure Sheet for further information. Stress safety. Ask questions to check student understanding. (Allow 3 hours for demonstration.)
<u>DEVELOPMENT. #2</u> Harris LXG Offset Press 1. SHEET FEED SYSTEMS a. Single sheet feeder b. Stream-fed feeder 2. CONTROLS a. Master control panel b. Three button control station c. Six button control station d. Inch button control station (feeder end) 3. FEEDER ASSEMBLY a. Feeder board controls b. Measure stock c. Position pile guide bars d. Wind and jog stock e. Load stock f. Feeder latch handle g. Position presser feet h. Adjust sheet separator mechanism i. Adjust pile height governor j. Check front flaps k. Position angle sheet guides l. Position stripper fingers m. Position air blast tubes	

Explain the difference.

Ask questions to check student understanding.

Stress safety.

Point out, explain and operate when possible.

Ask questions to check student understanding.

Have demonstrator use 500 sheets of stock, explain and demonstrate proper procedures. Refer to Detailed Procedure Sheet for further information.

Stress safety.

Ask questions to check student understanding.

SUBJECT MATTER OUTLINE	INSTRUCTIONAL TACTICS
4. SHEET TRANSPORTING AND POSITIONING DEVICES a. Conveyor tapes b. Pull-in wheels and shaft lever c. two sheet choke d. Move side guide e. Air and vacuum valve control lever f. Set air and vacuum gauges g. Electronic sheet detectors	Explain and demonstrate proper setup procedures. Refer to Detailed Procedure Sheet for further information. Stress safety.
	BREAK AT INSTRUCTOR'S DISCRETION
h. Stop fingers i. Sheet guards j. Register brushes k. Rubber drive wheels l. Wooden drive wheels m. Sheet holddowns n. Adjust side guide o. Side guide changeover p. Feed rollers q. Curved sheet holddowns r. Gauge pins s. Cylinder grippers	Demonstrate changeover and explain side guide roller pressure and plate setting. Ask questions to check student understanding.
5. DELIVERY ASSEMBLY a. Gripper fingers and bars b. Skeleton cylinder c. Stripper fingers d. Sheet stops e. Delivery board f. Delivery release cam adjustment g. Manual control handle h. Jogger blades i. Automatic pile receder j. Continuous delivery	Point out and explain all components. Demonstrate all adjustments necessary. Refer to Detailed Procedure Sheet for further information. Stress safety. Ask questions to check student understanding. (Allow 3 hours for demonstration.)

SUBJECT MATTER OUTLINE	INSTRUCTIONAL TACTICS
<u>DEVELOPMENT #3</u> Harris L-129-BC Offset Press 1. SHEET FEEDING SYSTEMS a. Single sheet feeder b. Stream-fed feeder 2. CONTROLS a. Master control panel b. Eight button control panel c. Three, three-button panels 3. FEEDER ASSEMBLY a. Feeder controls b. Position feeder board c. Fold sheet of stock and position on feeder board d. Position pile guide bars e. Wind and jog stock f. Load stock in feeder g. Pull back sheet separator mechanism h. Raise pile i. Move sheet separator mechanism back in j. Set pile height control k. Adjust pile height by running press l. Set sheet separator mechanism to final setting 4. CONVEYOR SYSTEM AND POSITIONING DEVICES a. Conveyor tapes b. Pull-in wheels c. Air control valve and pull-in wheels control lever d. Move side guide e. Two sheet choke	Explain the difference. Ask questions to check student understanding. Point out, explain and operate when possible. Stress safety. Ask questions for student understanding. Have demonstrator use 500 sheets of paper, explain and demonstrate proper procedures. Stress safety. Refer to Detailed Procedure Sheet for further information. Ask questions to check student understanding. Explain and demonstrate proper setup procedures. Refer to Detailed Procedure Sheet for further information. Stress safety. BREAK AT INSTRUCTOR'S DISCRETION

SUBJECT MATTER OUTLINE	INSTRUCTIONAL TACTICS
f. Transport sheet to stop A, leave air on g. Register brush wheels h. Rubber drive wheels i. Wooden drive wheels j. Set side guide Insure lock-up plate is in the Out position. k. Photocell detector 5. DELIVERY ASSEMBLY a. Gripper bars b. Skeleton cylinder c. Stripper fingers d. Sheet stops e. Delivery board f. Delivery release cam g. Manual control handle h. Jogger blades i. Automatic pile receder j. Vacuum wheels k. Vacuum wheels control knob l. Air bars m. Air bar control knob n. Air valve gear side	Point out and explain all components and demonstrate all adjustments necessary. Demonstrate changeover and explain side guide roller pressure and lock-up plate. Ask questions for student understanding. Point out all components and demonstrate all adjustments necessary. Stress safety. Refer to Detailed Procedure Sheet for further information. Ask questions to check student understanding. (Allow 3 hours for demonstration.)
<u>APPLICATION</u>	Students are to perform student practical exercise. (Allow 23 hours for PE)
	BREAK AT INSTRUCTOR'S DISCRETION

SUBJECT MATTER OUTLINE	INSTRUCTIONAL TACTICS
<u>EXAMINATION</u>	Students are to perform Student Examination 1. (Allow 1 hour and 45 minutes for exam and 15 minutes for critique.) Grading for this exam is by Assistant Instructor assigned to each designated group.
<u>SUMMARY</u> Within the last 28 hours of instruction you, through actual hands-on, prepared the CFD on your presses and successfully ran paper through the printing cycle. During this time, many of you encountered some of the problems that an offset pressman faces during daily operation of an offset press. Remember well what you have learned, for, proper setting of these assemblies will become more and more important to you when you get into the printing lessons of this course. Proper setup will not only aid you to smooth operation during printing, but will also save valuable time that you will be able to put to more effective use in producing clear and clean printed images. The functioning of the paper cycle in press operation is directly related to the next lesson, Prepare Cylinder Assembly, which provides the image to the paper as it goes through the printing cycle.	Summary will be given in the classroom.

740-303-A-020-010
Demonstration A1

DEMONSTRATION

LESSON: Prepare Controls, Feeder and Delivery Assemblies

OBJECTIVE: To demonstrate to the student the proper procedures to operate the controls and prepare the feeder and delivery assemblies of the ATF-DP Offset Press, LXG Offset Press or the L-129-BC Offset Press.

SUPPORT REQUIREMENTS:

1. ATF-DP Offset Press, LXG or L-129-BC Press - 1 per three designated groups.
2. TM 5-245 (Jul 70), Offset Photolithography and Map Reproduction, and Harris Operator's Manual - 1 per press
3. One assistant instructor per press
4. Map Stock - 500 sheets per press
5. Oil Can w/OE30 wt oil - 1 full can per press
6. Oil, G090 weight - as required
7. Rags, wiping - as required
8. Press Tool Kit - 1 per press
9. SPE A1, 740-303-B-010
10. Time required - 4 hours

SUBJECT MATTER OUTLINE	INSTRUCTIONAL TACTICS
This demonstration will provide the student with sufficient knowledge to prepare the controls, feeder and delivery assemblies of the ATF-DP Offset Press, LXG or L-129-BC.	Instructor will have students position themselves around demonstration press so that they will be able to observe all procedures. The development for this demonstration is also the student practical exercise and will be covered completely. (Use detailed procedure sheet for demo.) The instructor will cover each step in a narrative manner while the assistant instructor demonstrates the steps. The instructor will read each caution note before the assistant instructor demonstrates that step. After each major step, the primary instructor will check student understanding before proceeding.

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STUDENT PRACTICAL EXERCISE

LESSON: Prepare Controls, Feeder and Delivery Assemblies

OBJECTIVE: During this exercise, the student will perform operator's safety check of the press, operate all controls, set-up the feeder, register and delivery assemblies, wind, jog and load the press with 500 sheets of map stock, make final adjustments and operate the press to run 250 sheets without stopping.

STUDENT MATERIALS AND EQUIPMENT:

1. Map Stock - 500 sheets per press
2. Oil can w/OE30 wt oil - 1 full can per press
3. Oil, G090 wt - as required
4. Rags, wiping - as required
5. Press Tool Kit - 1 per student
6. ATF-DP, Harris LXG or L-129-BC Offset Press - 1 per designated group

SPECIAL REQUIREMENTS:

1. One assistant instructor per two designated groups during this PF.
2. Time required: 2 hours per student and repeated for a total of 14 hours.

STUDENT REQUIREMENTS: Using detailed and outlined Procedure Sheets 1, 2 or 3, operate all controls as necessary to prepare the press feeder, register mechanism and delivery, to run 250 sheets thru the press without stopping.

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CONTROLS, FEEDER AND DELIVERY ASSEMBLIES

DETAILED PROCEDURE SHEET #1

(ATF-DP)

1. Perform Safety Check
2. Prepare Feeder For Loading
 - a. Position sheet of stock
 - (1) Fold sheet of stock in half lengthwise
 - (2) Flatten folded sheet on feeder board
 - (3) Offset sheet centerfold 1/8 inch from feeder board center mark according to the side guide being used
 - b. Position L-shaped pile guide bars
 - (1) Loosen locking device on operator side guide bar
 - (2) Position guide bar flush with edge of stock
 - (3) Tighten locking device
 - (4) Loosen locking device on gear side guide bar
 - (5) Position guide bar 1/16th inch from pile
 - (6) Tighten locking device
3. Prepare And Load Stock
 - a. Prepare stock for loading
 - (1) Remove sheet of stock from feeder board
 - (2) Wind stock on table to separate sheets
 - (3) Jog stock on table to even gripper and side guide edges
 - b. Load stock onto feeder board
 - (1) Remove small lift from stack and place on feeder board
 - (2) Position stock against front guide bars and operator side guide bar
 - (3) Depress paper to remove air
 - (4) Repeat steps (1), (2), and (3) until stock is loaded

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4. Position Sucker Feet

- a. Call clear
- b. Manually move flywheel forward until sucker feet are in their lowest position
- c. Space sucker feet evenly across the sheet
 - (1) Loosen lock screws
 - (2) Slide sucker feet on bar until evenly spaced
 - (3) Tighten lock screws

CAUTION: Insure that when positioning sucker feet they will not come into contact with other devices during operation.

5. Raise Feeder Board

- a. Release pawl and keeper
- b. Manually turn the handwheel until the stock is $\frac{1}{4}$ inch from bottom of sucker feet

6. Position Corner Brackets

- a. Side setting
 - (1) Loosen shaft locking device
 - (2) Move shaft and position side bracket arm against pile without binding
 - (3) Tighten locking device
- b. Rear setting
 - (1) Loosen locking device
 - (2) Move bracket on shaft until rear bracket arm is positioned against rear of stock without binding
 - (3) Tighten locking device

7. Position Pile Height Governor

- a. Loosen locking device on shaft
- b. Move pile height governor on shaft until it is positioned approximately two inches in from the rear edge of the pile
- c. Tighten locking device

8. Position Tail Weights

- a. Lower tail weights

- b. Loosen locking device
- c. Position tail weights at an approximate 45 degree angle
- d. Tighten locking device

NOTE: After positioning of tail weights, insure that the locking device will not interfere with the movement of the pile height governor.

9. Set Pile Height Governor

a. Preliminary setting

- (1) Unlock and lower locking nuts
- (2) Turn knurled knob (counterclockwise) until the governor has cleared the pile.
- (3) Place a feeler strip between the governor and the pile.
- (4) Adjust the knurled knob until a fairly heavy pressure is noted when pulling the feeler strip.
- (5) Lock locking nuts
- (6) Manually lower the pile one to two inches
- (7) Engage pawl and keeper
- (8) Turn safes to run position
- (9) Call clear
- (10) Depress the start button to raise pile to height setting
- (11) Depress stop button and turn safes on
- (12) Call clear
- (13) Move flywheel to position sucker feet in lowest position
- (14) Check for $\frac{1}{4}$ inch distance between stack and sucker feet

b. Final setting

- (1) Loosen governor lock nuts
- (2) Move knurled knob and adjust setting as required
- (3) Lock locking nuts
- (4) Disengage pawl and keeper
- (5) Repeat steps 8 thru 14 of above

NOTE: Because the preliminary setting is based on pressure noted on the feeler strip, it can not be 100% accurate for everyone. Therefore, a final setting may be necessary until proper pressure feel is reached.

10. Set Air Blast Knobs

- a. Depress Air pump "ON" button
- b. Turn large knob for an opening of approximately $\frac{1}{4}$ to $\frac{1}{2}$ inch to set overall air blast
- c. Turn small center knob to allow the center blast tube to float approximately five sheets of paper
- d. Turn small knob on left to allow the two front vertical blast tubes to float approximately five sheets of paper
- e. Turn small knob on right to allow the floating whale nozzles to float approximately five sheets
- f. Depress Air pump "OFF"

11. Adjust Pull In Wheels

- a. Check wheels for even tension
- b. Turn necessary thumbscrew to obtain equal tension

NOTE: This is only a preliminary adjustment. Final adjustment is made while paper is being run through the press.

12. Set Two Sheet Choke

- a. Unlock locking bar
- b. Turn set screw to clear one sheet and completely stop the second sheet
- c. Lock the locking bar

NOTE: Use a feeler strip that has been folded to allow approximately a two inch difference at the edges.

13. Move Side Guide

- a. Unlock locking device
- b. Move side guide toward operators side so as not to interfere with the first sheet of paper
- c. Lock the locking device

14. Adjust Suction

- a. Place safes on "JOG"
- b. Call "clear"

- c. Depress air pump "ON" button
- d. Lift feeder valve handle
- e. Jog the press until the sucker feet pick up the top sheet of paper and transport it to a point about 3/4 of the distance to the pull in wheels
- f. Depress the impression throw-on lever
- g. Turn safes to "ON" position
- h. Check pressure gauge on gear side of press
- i. Turn knurled knob adjustment to obtain a reading of 15 psi

15. Transport Sheet To Head Stops

- a. Place safes on "JOG"
- b. Call clear
- c. Jog the sheet half way onto the conveyor table
- d. Depress manual at operators side of press
- e. Depress vacuum pump "OFF" button
- f. Turn safes to "ON" position
- g. Manually turn the flywheel until sheet reaches the head stops and cylinder grippers are 1/4 inch from closing
- h. Use a pencil to mark conveyor board at side guide edge of sheet

16. Set Sheet Flattener Bar

- a. Loosen locking device
- b. Turn set screw to obtain a light setting over the sheet
- c. Tighten locking device

NOTE: To check for light setting, twirl the bar and listen for a slight whispering sound.

17. Set Register Wheels

- a. Check tension
 - (1) Lift wheels to check for even tension
 - (2) Turn knurled knobs to adjust springs for even tension
- b. Set wheels to sheet
 - (1) Obtain a feeler strip
 - (2) Loosen locking device
 - (3) Adjust each register wheel to the tail end

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- of sheet until a feeler strip can be positioned even with back edge of sheet and touching point of register wheel.
- (4) Tighten locking device

18. Set Side Guide

- a. Insure paper is even with previously placed mark on conveyor table
- b. Unlock locking device
- c. Slide the side guide and sheet in 1/8 of an inch from mark
- d. Lock the locking device

19. Set Delivery Assembly

- a. Check delivery table to insure that it is positioned to the jogger blades
- b. If movement of the delivery board is necessary, release the pawl from the ratchet and raise the delivery board using the manual handle
- c. Loosen lock screws on side jogger blades
- d. Move the side jogger blades out so as not to interfere with the sheet dropping onto the delivery board
- e. Place safes on "JOG"
- f. Call clear
- g. Use delivery stations controls and jog the sheet through the press until it drops onto the delivery board and the gripper bar reaches the upper level on the delivery chain cycle
- h. Turn safe to "ON" position
- i. Place one hand on the sheet to prevent movement
- j. Adjust side joggers one at a time to obtain a slight pressure on the paper
- k. Lock side jogger locking screws after each setting
- l. Move paper forward until it contacts the sheet stops
- m. Loosen back jogger set screws
- n. Position back jogger blades into contact with rear edge of paper
- o. Tighten set screws

20. Operate Press

- a. Turn safes to "RUN" position
- b. Call clear
- c. Depress start button
- d. Depress air pump "ON" button

- e. Lift feeder valve handle
- f. Depress impression throw-on handle just as sheet is about to reach the sheet flattener bar
- g. Make final adjustments on air blast, vacuum, and pull in wheels if necessary.

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C. F. D. ASSEMBLIES

OUTLINED PROCEDURE SHEET

(ATF-DP)

- 1. Make a visual and manual safety check.
- 2. Fold a sheet of stock in half and position on feeder board.
- 3. Adjust L-shaped pile guide bars.
- 4. Wind and jog the stock.
- 5. Load the feeder board.
- 6. Lower sucker feet to lowest position.
- 7. Raise pile to $\frac{1}{2}$ inch below the sucker feet.
- 8. Position corner brackets.
- 9. Position pile height governor.
- 10. Position tail weights.
- 11. Adjust pile height governor and check for proper height.
- 12. Adjust over-all air blast knob and the three air blast tube knobs.
- 13. Set the pull in wheels.
- 14. Adjust the two sheet choke.
- 15. Move side guide out.
- 16. Pick up one sheet and check vacuum pressure.
- 17. Move sheet onto the conveyor board to the head stops.
- 18. Position impression cylinder grippers $\frac{1}{2}$ inch from closing.
- 19. Adjust sheet flattener bar, (whisper bar).
- 20. Adjust register wheels.
- 21. Adjust side guide for $\frac{1}{8}$ th inch push.
- 22. Move delivery board up to jogger blades
- 23. Move jogger blades out.
- 24. Jog the sheet through the printing cycle onto the delivery board.
- 25. Set the side and rear jogger blades.
- 26. Run sheets through the press to check your set up.

Appendix 1 to Student
Practical Exercise

CONTROLS, FEEDER AND DELIVERY ASSEMBLIES

DETAILED PROCEDURE SHEET #2

(Harris LXG Press)

1. Perform safety check and fill out DA Form 2404 (Daily Maintenance).
2. Prepare Feeder For Loading
 - a. Measure stock
 - b. Center feeder board
 - c. Loosen thumbscrews on L-shaped pile guide bars
 - d. Move operator side L-shaped pile guide bar toward operator side of press
 - e. Position inside edge of gear side pile guide bar even with scale reading equivalent to stock size
 - f. Place sheet of stock on feeder board and position against front guides and gear side L-shaped pile guide bar
 - g. Move operator L-shaped pile guide bar inward until flush with edge of paper and lock thumbscrews
 - h. Move gear side guide bar until 1/16th inch from edge of paper and lock thumbscrews

NOTE: This adjustment will require checking after paper has been set to proper height.

3. Prepare And Load Stock
 - a. Prepare stock for loading
 - (1) Remove sheet of stock from feeder board
 - (2) Wind stock on table to separate sheets
 - (3) Jog stock on table to even gripper and side guide edges
 - b. Load stock onto feeder board
 - (1) Remove small lift from stack and place on feeder board
 - (2) Position stock against front guide bars and operator side L-shaped guide bar
 - (3) Depress paper to remove air
 - (4) Repeat steps (1), (2) and (3) until stock is loaded

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4. Position Presser Feet

- a. Place feeder latch handle into first position
- b. Turn safes to off position
- c. Call clear
- d. Jog press until presser feet are in lowest position
- e. Turn safes to on position

5. Raise Feeder Board

- a. Depress up button to automatically raise the feeder board until stopped by limit switch
- b. Engage manual handle
- c. Manually raise the feeder board until the top of the pile reaches the same level as the bottom of the presser feet
- d. Disengage the manual handle

6. Position Sheet Separator Mechanism

- a. Loosen locking device and turn knurled wheel until presser feet are positioned approximately $\frac{3}{8}$ inch onto the pile
- b. Lock the locking device

7. Set Pile Height Governor

- a. Raise pile feeder latch raising pawl handle
- b. Engage manual handle and lower pile approximately $\frac{1}{2}$ inch
- c. Disengage manual handle
- d. Loosen pile height governor locking device
- e. Turn governor adjusting screw down several turns
- f. Turn safes to off positions
- g. Call clear
- h. Depress run and inch buttons simultaneously to start press
- i. Allow pile to raise automatically to height setting
- j. Depress top of pile next to presser feet
- k. Check for no gap between bottom of presser feet and top of pile
- l. If gap exists, turn governor set screw until collar on manual raise handle moves one notch
- m. Recheck for gap
- n. Repeat steps j thru m until no gap is apparent
- o. Depress stop button.
- p. Turn safes to on position
- q. Lock governor locking device

- r. Check front flaps for $\frac{1}{4}$ inch distance from top of pile to top of flaps

NOTE: Due to curl in paper, it may be necessary to lower the pile and build up the rear of the pile with paper or wedges to obtain the $\frac{1}{4}$ inch flap distance.

8. Set Angle Sheet Guides

- a. Loosen thumbscrew
- b. Position guide to approximately two inches from the corner of the pile
- c. Position the guide vertically until the top of the guide is approximately $\frac{1}{4}$ inch above the pile
- d. Tighten thumbscrew
- e. Turn knurled adjustment wheel until the front of the angle sheet guide lightly touches the rear of the pile

NOTE: Set one angle sheet guide at a time.

9. Position Stripper Fingers

- a. Loosen thumbscrew
- b. Position stripper finger behind forwarding suckers
- c. Turn knurled adjustment wheel until stripper fingers extend approximately $\frac{1}{4}$ inch onto rear of pile
- d. Lower stripper finger until finger extends $\frac{1}{8}$ inch onto rear of pile
- e. Tighten thumbscrews

NOTE: Position stripper fingers one at a time. Item b is only a starting point and stripper fingers may be moved to outside the pick-up suckers if feeding difficulty is encountered.

10. Position Air Blast Tubes

- a. Move the horizontal tubes until approximately $\frac{1}{4}$ inch above the pile
- b. Move the vertical tubes until center of tube is even with top of pile

11. Set Pull In Wheels

- a. Insure that raising handle is in up position and wheels are riding on conveyor tapes

- b. Check wheels for even tension
- c. Adjust thumbscrew or thumbscrews to obtain necessary even tension

NOTE: This is only a preliminary adjustment. Final adjustment may be made while paper is being run through the press.

12. Adjust Two Sheet Choke

- a. Turn safes to off position
- b. Engage feeder latch handle in the first position
- c. Call clear
- d. Jog press until choke rod is in highest position
- e. Turn safes to on position
- f. Turn knurled adjustment screw to obtain no drag on one sheet and drag or completely stop the second sheet

NOTE: A feeler strip that has been folded to allow approximately a two inch difference in the edges should be used for this setting.

13. Move Side Guide

- a. Turn the micro adjustment set screw to center the stop block between the body of the side guide and the side guide play
- b. Lift the side guide plate and depress the holding pin
- c. Release the raising rod
- d. Loosen side guide locking device
- e. Move the side guide until the stop block is positioned on a scale reading that is at least $\frac{1}{2}$ inch more than the paper measurement
- f. Lock the locking device

14. Adjust Air and Vacuum

- a. Turn safes to off position
- b. Depress vacuum pump on button
- c. Lower air and vacuum control lever
- d. Call clear
- e. Jog the press until pickup and forwarding suckers have control of the sheet and the horizontal blast tubes are blowing air
- f. Set air and vacuum gauges

(1) Set air pressure

- (a) Loosen ball check valve locking device
- (b) Turn set screw to obtain proper air
- (c) Tighten locking device

(2) Set vacuum

- (a) Loosen ball check valve locking device
- (b) Turn set screw to obtain proper vacuum
- (c) Tighten locking device

NOTE: As a starting point, the air and vacuum gauges should be set for a reading of 6 on the gauges. If this proves to be too much or too little, adjustment must be made accordingly.

15. Transport Sheet to Stop Fingers

- a. Turn safes to off position
- b. Engage feeder latch handle in first position
- c. Call clear
- d. Jog press until sheet is controlled by the pull in wheels
- e. Lift air and vacuum valve control lever
- f. Depress air and vacuum pump off button
- g. Continue to jog sheet until it reaches the stop fingers
- h. Turn safes to on positions

16. Set Register Brushes

- a. Check tension
 - (1) Lift brushes to check for even tension
 - (2) Turn knurled knobs to adjust springs for even tension
- b. Set brushes to sheet
 - (1) Loosen locking device
 - (2) Move brush until center of brush is even with rear edge of sheet

17. Set Rubber Drive Wheels

- a. Check tension
 - (1) Lift wheels to check for even tension

- (2) Turn knurled knobs to adjust springs for even tension

b. Position wheels

- (1) Loosen locking device
- (2) Move wheel to position behind rear edge of sheet
- (3) Lock Locking device

NOTE: Insure wheels do not touch sheet being registered.

18. Set Wooden Wheels

a. Check tension

- (1) Lift wheels to check for even tension
- (2) Turn knurled knobs to adjust springs for even tension

NOTE: Only enough tension to allow the wheels to rotate is necessary

b. Position wheels

- (1) Loosen locking device
- (2) Move wheels to position half way from rear of sheet to gripper edge
- (3) Lock locking device

19. Set Side Guide

- a. Release locking device
- b. Move side guide until stop block is 3/16 to 1/4 inch from edge of paper
- c. Lock locking device
- d. Release lifting rod locking device
- e. Move lifting rod for vertical position
- f. Lock lifting rod locking device
- g. Attach lifting rod
- h. Lift plate, release lock up pin and lower the plate

20. Set Delivery Assembly

- a. Check empty pile board for correct position.
- b. To bring board to highest position, set pile down feed dial to "raise pile" and use manual handle to bring pile to highest position.

- c. Check for wedges, one in rear and one next to each side jogger blade
- d. Loosen thumbscrews on side jogger blades and move outward
- e. Lock thumbscrews
- f. Turn safes to off position
- g. Call clear
- h. From delivery station, jog sheet through press until the gripper bar, carrying sheet of stock, reaches a point about one inch into the stripper fingers
- i. Turn safes to on position
- j. Unlock operator side stationary jogger blade and move to lightly contact edge of sheet
- k. Lock thumbscrew
- l. Turn safes to off position and call clear
- m. Jog press until "gear side" jogger blade reaches inner most position
- n. Turn safes to on position
- o. Unlock thumbscrew and position jogger blade to lightly contact edge of sheet
- p. Lock thumbscrew
- q. Pull paper forward to front stops
- r. Open operator side guard door
- s. Release thumbscrew for back jogger blade and turn red star shaped knob to position the back jogger blade to rear edge of sheet
- t. Lock thumbscrew and close guard door

21. Operate Press

- a. Turn safes to off position and call clear
- b. Depress run and inch buttons simultaneously
- c. Depress air and vacuum pump on button
- d. Insure that feeder latch handle is in first position to start feeder mechanism
- e. Lower air and vacuum valve control lever
- f. Move feeder latchhandle forward to put press on impression when paper reaches a point just forward of the side guide
- g. Make visual check of settings while machine is operating

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C. F. D. ASSEMBLIES
OUTLINED PROCEDURE SHEET
(LXG)

1. Make a visual and manual safety check.
2. Measure the stock.
3. Center feeder board.
4. Position gear side L-shaped pile guide bar on proper scale reading.
5. Position operator side L-shaped pile guide bar.
6. Reposition gear side L-shaped pile guide bar.
7. Wind and jog stock.
8. Load the stock onto the feeder board.
9. Lower presser feet to lowest position.
10. Elevate stock to presser feet.
11. Position sheet separator mechanism.
12. Adjust pile height governor.
13. Check pile height governor for proper height.
14. Adjust angle sheet guides.
15. Adjust stripper fingers.
16. Adjust air blast tubes.
17. Set pull in wheels.
18. Adjust two sheet choke.
19. Move side guide out.
20. Check air and vacuum gauges and adjust if necessary.
21. Move sheet down conveyor board to stop fingers.
22. Position register wheels.
23. Position rubber and wooden drive wheels.
24. Adjust side guide for 3/16" to 1/4" inch pull.
25. Move delivery board up to jogger blades.
26. Move jogger blades out.
27. Jog the sheet through the printing cycle onto the delivery board.
28. Position stationary jogger blade, side jogger and rear jogger blade.
29. Run sheets through the press to check your set up.

Appendix 2A to Student
Practical Exercise

CONTROLS, FEEDER AND DELIVERY ASSEMBLY

DETAILED PROCEDURE SHEET #3

(L-129-BC)

1. Perform safety check and fill out DA Form 2404 (Daily Maintenance).
2. Electrical Controls and Master Control
3. Alignment of Feeder Board
Align center mark on board with center line on center pile guide.

4. Alignment of Paper Stock for Feeder Board
 - a. Fold sheet of stock in half.
 - b. Flatten folded sheet on feeder board.
 - c. Place sheet on the feeder board and center on line 1/4" off center mark away from side guide to be used.

5. Adjust L-shaped Pile Guide Bars
 - a. Loosen lock screw on L-shaped guide bars.
 - b. Adjust L-shaped guide bars to touch the edge of sheet.

6. Wind and Jog Paper Stock
 - a. Remove folded sheet from feeder board.
 - b. Wind stock on table to separate sheets.
 - c. Jog paper to gripper and side guide side.

7. Load Paper Stock on Feeder Board
 - a. Remove small lift from stock and place on feeder board.
 - b. Position stock against front guide bars and L-shaped guide bar on same side as side guide to be used.

8. Position Sheet Separator Mechanism

Loosen locking device and move separator to position for maximum size stock.

9. Raise Feeder Board
 - a. To raise pile, move pile hoist control to the lower position.
 - b. Rotate the motor control handle clockwise and let pile raise to bottom of flap shaft.

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10. Position of the Sheet Separator Mechanism

Move separator in until sheet backers are 1/16" from edge of pile.

11. Adjust Pile Height Governor

- a. Place feeder latch handle in number one position.
- b. Push ready button to release safes.
- c. Push run and inch buttons simultaneously.
- d. Let press run until pile stops raising.
- e. Turn pile height control counterclockwise until the pile rises to 3/16" below flap shaft.

12. Position of Sheet Separator Mechanism

- a. Move separator mechanism until sheet backers just touch pile.
- b. Lock separator in position.

13. Adjust Strippers (Sheet Separators)

Adjust strippers to extend 1/8" on pile and with a light tension.

14. Pull-In Wheels

Loosen lock screws and position pull-in wheels, centered on the two center tapes.

15. Adjust the Two-Sheet Choke

- a. With feeder engaged, jog press to a reading on timing dial of 225° to 250°.
- b. Depress safety buttons.
- c. Using two strips of paper (same weight as in feeder) place strips under two-sheet choke and adjust until there is a medium drag on two strips and one strip is free.

16. Adjusting the Side Guide

- a. Using the micrometer adjustment, move the guide to midway point of the micro adjustment.
- b. Make sure the guide is in position to clear the first sheets.
- c. Inch a stream of sheets down the conveyor until first sheet is under the side guide. Stop the press when side guide roller is in the "up" position.
- d. Raise air control lever to "off" position.

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- e. Unlock the knurled lock screw and move the guide until the stop block is 1/4" from sheet, lock knurled lock screw.
 - f. Unlock knurled locking collar on the roller tension adjusting screw.
 - g. Run press and back off roller tension until the sheets are not pulled to stop block.
 - h. Adjust roller tension until each sheet is just pulled to stop block.
 - i. Lock the knurled locking collar.
17. Transport Sheet to Stops
- a. Jog the press until first sheet is against stops.
 - b. Raise air control lever to "off" position and depress safe buttons.
18. Position Register Brush Wheels
- a. Position register brushes at tail edge of sheet and gripper edge of sheets is against stops.
 - b. Adjust the tension on brushes to a light even tension.
19. Position Rubber Drive Wheels
- a. Position rubber drive wheels 3" from the tail edge of the sheet.
 - b. Adjust to a light even tension.
20. Position Wooden Wheels
- a. Space wooden wheels evenly across center of sheet.
 - b. Adjust to a light even tension.
21. Adjust Photocell Detector
- a. Engage the feeder in the first position and inch press to a time dial reading of exactly 270°.
 - b. Turn the lamp intensity adjusting knob on the console to the lowest setting.
 - c. With sheet against stops, depress the test button and adjust lamp intensity until the sheet can be moved 1/16" away from stops before trip is activated.
22. Delivery Assembly
- a. Check delivery board to insure that it is in the "up" position and not binding.
 - b. Push in manual crank for raising and lowering delivery. With crank pushed in, delivery pile will not lower as feeder rises. (After approximately 100 sheets are on the delivery board, pull

crank out so pile will lower automatically.)

- c. Check for wedges, one in rear and one next to each side jogger.
- d. Unlock side joggers and move out for large sheet.
- e. Inch sheets through the press and stop with one sheet on delivery board and through top window on delivery, one delivery bar is directly above the other. (In this position, joggers have reached their maximum stroke inward.)
- f. Place sheet on delivery board directly under the sheet held in the grippers.
- g. Move side joggers in to touch sheet and lock in position.
- h. Unlock rear jogger control and move rear jogger in to just touch sheet and lock in position.
- i. Delivery air and vacuum controls. Run the press and turn on air and vacuum controls. Turn vacuum control knob until sheets drop in delivery and do not hit hard on end gate. Adjust pressure control knob until sheets are blown down and settle on pile evenly.
- j. Delivery release cam. By turning cam control, sheet can be made to drop in delivery earlier or later. Adjust in combination with air and vacuum control.
- k. Feeder latch handle on delivery end of press can be used to start printing if press has been stopped with a sheet down to the stops.

23. Operation of the Press

- a. Depress "ready" button.
- b. Call "clear".
- c. Depress "run" and "inch" buttons simultaneously.
- d. Turn on air.
- e. Place feeder latch handle in number one position.
- f. Move air control lever to "on" position.
- g. Place feeder latch handle in number two position when the first sheet has reached a point just forward of the side guide.
- h. Adjust the vacuum gauge to a reading of 4" to 5" vacuum.
- i. Adjust the air and vacuum on feeder to a reading of 4" to 5" vacuum and 4" to 5" pressure on air.
- j. Make a visual check of press from the feeder thru the delivery.
- k. Turn the press off. Raise air control lever to "off" position. When last sheet clears impression cylinder, turn air off. Depress safety button when last sheet drops on delivery pile.

CONTROLS, FEEDER AND DELIVERY ASSEMBLY

OUTLINE PROCEDURE SHEET

(L-129-8C)

1. Make visual and manual safety check.
2. Check electrical controls and turn speed control to lowest setting.
3. Center feeder board.
4. Fold sheet in half and place on feeder board.
5. Position the L-shaped pile guide bars.
6. Wind and jog paper.
7. Load feeder board.
8. Position sheet separator to clear paper pile.
9. Raise pile to bottom of flap shaft.
10. Preliminary position of sheet separator.
11. Adjust pile height governor.
12. Position sheet separator for operation.
13. Adjust stripper fingers.
14. Adjust pull-in wheels.
15. Adjust two-sheet choke.
16. Adjust side guide to midway point of micro adjustment and move guide enough to clear first sheet.
17. Transport sheet to stops.
18. Set register brush wheels.
19. Position rubber drive wheels.
20. Position wooden wheels.
21. Adjust photocell detector.
22. Adjust delivery joggers.
23. Operate press and check all adjustments.

Appendix 3A to SPE

EXAMINATION SUPPORT SHEET

LESSON: Prepare Controls, Feeder and Delivery Assemblies

OBJECTIVE: The student will be examined to:

- a. Determine his/her ability to prepare controls, feeder and delivery of the ATF-DP, LXG or L-129-BC Offset Presses.
- b. Determine his/her knowledge of the Offset Press paper cycle.

STUDENT MATERIALS AND EQUIPMENT:

1. Map Stock - 500 sheets per student.
2. Oil Can w/OE30 wt oil - 1 full can per student
3. Oil, G090 - as required
4. Rags, wiping - as required
5. Press Tool Kit - 1 per student
6. ATF-DP, LXG or L-129-BC Offset Press - 1 per designated group

SPECIAL REQUIREMENTS:

1. One assistant instructor per two designated groups
2. Time requirements - 2 hours per student

ADMINISTRATIVE INSTRUCTIONS:

1. This is a combination examination. It combines performance tasks to determine if the student can operate controls and prepare the feeder and delivery assemblies, along with verbal responses to determine if the student knows the proper sequence of the paper cycle.

2. One hour and 45 minutes should be allowed to complete this exam and 15 minutes for the assistant instructor to grade and critique each student.

3. Exam grade sheets are located in the Division office and are identified as Practical Exercise Grading Sheets 1, 2 or 3, Lesson 740-303-B-010. The same grading sheet is used for all classes.

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(LXG)
 PRACTICAL EXERCISE TEST
 CONTROL, FEEDER AND DELIVERY ASSEMBLY
 INSTRUCTOR'S CUT SHEET

STUDENT TIME ALLOWED: 105 minutes

INSTRUCTOR TIME ALLOWED: 15 minutes

1. One error - minus 5
 Two errors - minus 7
 Three errors - minus 12

2. a. Yes or No
 b. Yes or No
 c. Yes or No
 d. Pile not at proper height - minus 6
 Governor not set when at lowest position - minus 6
 e. Yes or No
 f. Yes or No
 g. Too low - minus 2
 Too tight - minus 2
 Too loose - minus 3
 h. Yes or No
 i. Yes or No
 j. Yes or No
 k. Too tight - minus 5
 Too loose - minus 6
 l. Yes or No
 m. Wrong side used - minus 2
 Improper amount of pull - minus 4
 Arm not in proper position - minus 5
 n. Not touching the sheet - minus 5
 Buckling the sheet - minus 3
 Unequal tension - minus 3

3. a. Jogging only fair - minus 3
 Jogging poor - minus 6
 b. Yes or No
 c. Yes or No

PRACTICAL EXERCISE GRADING SHEET			NAME	ROSTER NR.
START TIME	FINISH TIME	GRADER	DATE	GRADE
MANNER OF PERFORMANCE FOR CONTROL, FEEDER AND DELIVERY ASSEMBLY				
OBJECTIVES (DP)			WTS.	PEN. CRS.
1. USE OF CONTROLS			12	
2. ADJUSTMENT OF FEEDER				
a. Positioning of stock and pile guide bars			6	
b. Windup and jogging of stock			6	
c. Positioning of sucker feet			8	
d. Adjustment of pile height governor			12	
e. Position of pile height governor			6	
f. Adjustment of tail weights			6	
g. Positioning of corner brackets			7	
h. Amount of air blast			12	
i. Amount of suction			7	
j. Tension of pull in wheels			9	
k. Adjustment of two sheet choke			12	
l. Adjustment of sheet flattener bar			9	
m. Operation of side guide			11	
n. Adjustment and positioning of registration wheels			11	
3. ADJUSTMENT OF DELIVERY				
a. Adjustment of logger blades			8	
b. Explain the operation of the automatic pile down-feed mechanism			8	
4. OBSERVANCE OF SAFETY REGULATIONS				
Number of violations 1/2/3/4/5/6/ X 5 pts each				
5. PRESS TECHNIQUES				
Number of violations 1/2/3/4/5/6/ X 2 pts each				
TOTAL			150	

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(DP)
PRACTICAL EXERCISE TEST
CONTROL, FEEDER AND DELIVERY ASSEMBLY
INSTRUCTOR'S CUT SHEET

STUDENT TIME ALLOWED: 105 Minutes

INSTRUCTOR TIME ALLOWED: 15 Minutes

1. One error - 5
 Two errors - 7
 Three errors - 12

2. a. Yes or No
 b. Yes or No
 c. Yes or No
 d. Pile not at proper height - minus 6
 Governor not set when at lowest position - minus 6
 e. Yes or No (Two inches in from tail edge of paper)
 f. Yes or No
 g. Yes or No
 h. Center blast - minus 2
 Air blast - minus 2
 Floating blast - minus 2
 Overall adjustment - minus 6
 i. Yes or No
 j. Yes or No
 k. Too tight - minus 6
 Too loose - minus 6
 l. Too high - minus 4
 Too low - minus 5
 m. Wrong side used - minus 2
 Improper amount of push - minus 3
 Spring and arm not in proper position - minus 4
 Sheet guard not changed - minus 2
 n. Not touching sheet - minus 5
 Buckling sheet - minus 3
 Unequal tension - minus 3

3. a. Jogging only fair - minus 5
 Jogging poor - minus 3
 b. Yes or No

PRACTICAL EXERCISE GRADING SHEET			NAME	POSTER NO.
STARTING TIME	FINISH TIME	GRADE	DATE	GRADE

MANNER OF PERFORMANCE FOR CONTROLS, FEEDER AND DELIVERY ASSEMBLY

	WTS	PEN	CNS
OBJECTIVES (L-129-BG)			
1. USE OF CONTROLS	12		
2. ADJUSTMENT OF FEEDER			
a. Position of stock and L-shaped pile guide bars	8		
b. Winding and jogging of stock	6		
c. Adjustment of pile height governor	12		
d. Positioning sheet separator mechanism	12		
e. Adjustment of stripper fingers	6		
f. Amount of air blast	8		
g. Amount of suction	8		
3. ADJUSTMENT OF CONVEYOR BOARD CONTROLS			
a. Tension and position of rubber drive wheels	8		
b. Tension of register brush wheels	8		
c. Positioning of register brush wheels	8		
d. Tension and position of wooden wheels	6		
e. Adjustment of two sheet choke	8		
f. Operation of side guide	10		
g. Vacuum belt, vacuum setting	10		
4. ADJUSTMENT OF DELIVERY			
a. Adjustment of jogger blades	14		
b. Explain the operation of automatic pile down-feed mechanism	6		
5. OBSERVANCE OF SAFETY REGULATION			
Number of violations /1/2/3/4/5/6/7/8/9/10/ x 5 pts each			
6. PRESS TECHNIQUES			
Number of violations /1/2/3/4/5/6/7/8/9/10/ x 2 pts each			
TOTAL	150		

TOTAL 150

PRACTICAL EXERCISE SHEET

Instructor's Cut Sheet

L-129-BC

STUDENT TIME: 1:50 minutes

INSTRUCTOR TIME: 10 minutes

1. One error - minus 5
Two errors - minus 7
Three errors - minus 12
2. a. Yes or No
b. Yes or No
c. Pile too low - minus 6
Pile too high - minus 6
d. Sheet separator mechanism too tight to pile - minus 6
Sheet separator mechanism too far from pile - minus 6
e. Yes or no
f. Too much air blast - minus 4
Not enough air blast - minus 4
g. Too much suction - minus 4
Not enough suction - minus 4
3. a. Improper tension - minus 4
Improper position - minus 4
b. Improper tension on one - minus 4
Improper tension on both - minus 8
c. Too tight on sheet - minus 4
Too loose on sheet - minus 4
d. Improper tension - minus 4
Improper position - minus 4
e. Will not allow one sheet to pass under freely - minus 4
Allows two sheets to pass under freely - minus 8
f. Too much pull - minus 5
Not enough pull - minus 5
Failed to set - minus 10
g. Too much suction - minus 5
Not enough suction - minus 5
4. a. Side joggers improperly set - minus 7
Back jogger improperly set - minus 7
b. Yes or No

SOURCE MATERIALS

LESSON: Prepare Controls, Feeder and Delivery Assemblies

LESSON OUTLINE DEVELOPMENT #A1 (ATF-DP Offset Press)

1. Sheet Feed Systems - TM 5-245, Offset Photolithography and Map Reproduction
Paragraphs 8-8, 8-9
2. Controls - TM 5-245
 - a. Paragraphs 8-5, 8-6, 8-7 and Figure 8-5
 - b. Paragraph 8-6 and Figure 8-5
 - c. Paragraph 8-6 and Figure 8-5
 - d. Paragraph 8-6 and Figure 8-5
 - e. Paragraph 8-15 and TM 5-3610-202-15, Paragraph 2-97
 - f. Paragraph 8-7b
3. Feeder Assembly - TM 5-245
 - a. Paragraph 8-10a (1)
 - b. Paragraphs 8-9, 8-10a (2), Figure 8-7
 - c. Paragraph 8-10a (3) and (4)
 - d. Paragraph 8-10a (5), Figure 8-8
 - e. Paragraph 8-10a (5), Figure 8-10
 - f. Paragraph 8-10a (6), Figure 8-11
 - g. Paragraph 8-10a (5), Figure 8-11
 - h. Paragraph 8-10b (3), Figure 8-7
 - i. Paragraph 8-10b (1), Figure 8-12
4. Sheet Transporting and Positioning Devices - TM 5-245
 - a. Paragraph 8-10c (1), Figure 8-15
 - b. Paragraph 8-10c (1), Figure 8-15
 - c. Paragraph 8-10c (2), Figure 8-15
 - d. Paragraph 8-10c (5), Figure 8-17
 - e. Paragraph 8-10b (2) (d), Figure 8-13
 - f. Figure 8-13 and TM 5-3610-202-15, Paragraph 2-98
 - g. Paragraph 8-10b (2) and Figure 8-14
 - h. Paragraph 8-10c (8), Figure 8-9
 - i. Figure 8-9
 - j. Paragraph 8-10c (4), Figure 8-9
 - k. Paragraph 8-10c (4)
 - l. Figure 8-9
 - m. Paragraph 8-10c (7)
 - n. Paragraph 8-10c (9)

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- o. Paragraph 8-10c (10) (a)
- p. Paragraph 8-10c (5) and (6)
- q. Paragraph 8-10c (6)

5. Trip Mechanisms - TM 5-245

- a. Paragraph 8-16f (1) (b)
- b. Paragraph 8-16F (1) (a)

6. Delivery Assembly - TM 5-245

- a. Paragraph 8-12 and Figure 8-18
- b. Paragraph 8-12 and Figure 8-18
- c. Paragraph 8-12 and Figure 8-19
- d. Paragraph 8-12 and Figure 8-19
- e. Paragraph 8-12 and Figure 8-19
- f. Paragraph 8-13a
- g. Paragraph 8-12 and Figure 8-20
- h. Paragraph 8-13b

SOURCE MATERIALS

LESSON: Controls, Feeder and Delivery

LESSON OUTLINE DEVELOPMENT #2 (Harris LXG Press)

1. Perform Safety Check

- a. TM 5-245 Paragraph 3-2
- b. Controls Harris Operating Manual
 - (1) Paragraph 20a, Photo 9, Figure 1
 - (2) Paragraph 20b, Photo 10, Figure 1
 - (3) Paragraph 18f, Photo 6, Figure 5
 - (4) Paragraph 20c, Photo 11, Figure 1
 - (5) Paragraph 20d, Photo 11, Figure 7

2. Feeder Assembly Harris Operating Manual

- a. Para 17a,b,c and 34
- b. Para N/A PROVEN EFFECTIVE THROUGH YEARS OF INSTRUCTION
- c. Para 33, Photo 28 and TM 5-245 Para 8-10a (2)
- d. Para N/A TM 5-245, Para 8-10a (3)
- e. Para 33 and TM 5-245, Para 8-10a (4)
- f. Para 20e, Photo 12, Figure 1
- g. Para 39a, Photo 26, Figure 3
- h. Para 39a, Photo 26
- i. Para 34, Photo 5, Figure 1
- j. Para 41, Photo 28, Figure 3
- k. Para 39g, Photo 26, Figure 7
- l. Para 39e, Photo 26, Figure 5
- m. Para 39f, Photo 26, Figure 6

3. Sheet Transporting and Positioning Devices - Harris Operating Manual

- a. TM 5-245, Para 8-10c, (1), Page 8-15
- b. Para 42, Photo 8, Figure 1, Photo 29, Figure 1
- c. Para 59, Photo 40, Figure 1
- d. Para 57, Photo 37
- e. Para 18b, Photo 7, Figure 1
- f. Para 18e, Photo 6, Figure 3
- g. Para 64, 65 and 66
- h. Para 61, Photo 40, Figure 3
- i. Para N/A
- j. Para 43
- k. Para 43, Photo 29, Figure 1
- l. Para 43

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- m. Para 54, Photo 33, Figure 7
- n. Para 57, Photo 37, Figure 7
- o. Para 57
- p. Para 49 & 50, Photo 33, Figure 1, Photo 34, Figure 5
- q. Para 55, Photo 33, Figure 5
- r. Para 45cc
- s. Para 45cc

4. Delivery Assembly - Harris Operating Manual

- a. Para 102, Photo 60, Figure 4
- b. Para N/A TM 5-245, Para 8-12 and Figure 8-18
- c. Para 100, Photo 60, Figure 3
- d. Para 106, Photo 62, Figure 3
- e. Para 107
- f. Para 98, Photo 60, Figure 1 and 2
- g. Para 101, Photo 66, Figure 1
- h. Para 95, Photo 66, Figure 3
- i. Para 101, Photo 66, Figure 4
- j. Para 107, Photo 67, Figure 1

SOURCE MATERIALS

LESSON: Controls, Feeder and Delivery

LESSON OUTLINE DEVELOPMENT #3 (L-129-BC)

1. Sheet Feed Systems - Harris Operating Manual Sec IV
2. Controls - Harris Operating Manual
 - a. Paragraph 4a, Photo 10, Fig 1,2,3,4,5,6,7,8,9,10,11,12,13,14
 - b. Paragraph 5c, Photo 12, Fig 1 and 2
 - c. Paragraph 5d, Photo 12a, Fig 1,2, and 3
 - d. Paragraph 9A, Photo
3. Feeder Assembly - Harris Operating Manual
 - a. Paragraph 2A, Photo 1, Fig 1,2,3,4,5
 - b. Paragraph 2d, Photo 2, Fig 1,2,3
 - c. Paragraph 2e, Photo 3, Fig 1,2,3
 - d. Paragraph 2f, Photo 4, Fig 1,2,3
 - e. Paragraph 2g, Photo 5, Fig 1,2,3
 - f. Paragraph 3a, Photo 6, Fig 1 and 2
 - g. Paragraph 3b, Photo 7, Fig 1,2,3
 - h. Paragraph 3c, Photo 8, Fig 1 and 2
 - i. Paragraph 3d, Photo 9, Fig 1,2,3,4,5
4. Sheet Transporting Devices - Harris Operating Manual
 - a. Paragraph 4a, Photo 10, Fig 9,10,11
 - b. Paragraph 4c, Photo 11, Fig 1
 - c. Paragraph 4c, Photo 12, Fig 1 and 2
 - d. Paragraph 6a, Photo 14, Fig 1 and 2
 - e. Paragraph 6b, c, Photo 15, Fig 1,2,3,4
 - f. Paragraph 6e, f, Photo 16, Fig 1,2,3,4,5
 - g. Paragraph 6f, Photo 17, Fig 1
 - h. Paragraph 6g, Photo 18, Fig 1,2,3
 - i. Paragraph 1,2, Photo 38, Fig 1,2,3,4,5,6
 - j. Paragraph 3, Photo 39, Fig 1,2,3,4
 - k. Paragraph 4, Photo 40, Fig 1,2,3,4
 - l. Paragraph 4, Photo 41, Fig 1,2,3
 - m. Paragraph 5, Photo 42, Fig 1,2,3
 - n. Paragraph 6, Photo 43, Fig 1,2,3,4

5. Delivery Assembly - Harris Operating Manual

- a. Paragraph 1, Photo 97, Fig 1,2,3,4,5
- b. Paragraph 2, Photo 98, Fig 1
- c. Paragraph 3, pg 71, Photo 101, Fig 1,2,3,4,5,6,7
- d. Paragraph 4, Photo 99
- e. Paragraph 4a, b, Photo 100, Fig 1,2,3
- f. Paragraph 5, Photo 101a
- g. Paragraph 7, Photo 102, Fig 1,2
- h. Paragraph 9, Photo 103, Fig 1,2,3
- i. Paragraph 9, Photo 104, Fig 1,2
- j. Paragraph 10, Photo 105, Fig 1

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LESSON PLAN

PREPARE CYLINDER ASSEMBLY
740-303-A-020-020

OFFSET PRINTING COURSE



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DEFENSE MAPPING SCHOOL — FORT BELVOIR, VIRGINIA

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LESSON REQUIREMENTS SHEET

COURSE: Offset Printing

LESSON: Prepare Cylinder Assembly

OBJECTIVE: Provided a small or medium offset press, with an appropriate operator's manual, press tools, rags, micrometer, offset blanket, offset plate, packing paper, a list of safety rules and TM 5-245, the student will properly prepare and mount the blanket and plate onto their respective cylinders. This will be accomplished in accordance with procedures outlined in the manual provided and he must achieve a grade of 70 to successfully complete this graded exercise.

TIME: 19 Hours: 2D, 15PE, 2E

TRAINING AIDS AND DEVICES:

1. Audio-Visual Aids or Devices: None
2. DA Training Aids: None
3. Service Training Aids:
 - a. Schematic Drawing - Annex A
 - b. Micrometer (mock-up) A-109-57

STUDENT MATERIALS AND EQUIPMENT:

- | | |
|---|--------------------------|
| 1. Offset press blanket | One per press |
| 2. Offset press plate | As required |
| 3. Packing paper | As required |
| 4. 36" rule (Harris press only) | One per press |
| 5. Razor blades | As required |
| 6. Chalk | Two pieces per class |
| 7. Rags | As required |
| 8. Oil can w/OE 30 oil | One full can/per class |
| 9. Offset press (ATF/DP, LXG, L-129-BC) | One per designated group |
| 10. Micrometer | One per designated group |

SPECIAL REQUIREMENTS:

1. TRAINING AREA:
 - a. 30-man classroom equipped with tablet arm chairs and chalk-boards.

- b. Pressroom equipped with one offset press and work bench for each designated group of students.
2. Assistant Instructors: One assistant instructor per designated group.

TEXT REFERENCES:

1. Instructor: TM 5-245 (7-70), Offset Photolithography and Map Reproduction, Chap 8, Sec V.

TM 5-3610-202-15 (3-63), Printing Press, Offset Cylinder - Rotary; Model DP-ATF, Chap I, Sec I, para 1-24 thru 1-54 and 1-77 thru 1-84; Sec II, para 2-26 thru 2-48, 2-72 thru 2-74 and 2-78 thru 2-115.

Harris Manufacturer's Manual, Sec VII, para 1-5; Sec VIII, para 71 thru 75.

2. Student; TM 5-245 (7-70), Offset Photolithography and Map Reproduction, Chap 8, Sec V

Harris Manufacturer's Manual, Sec VII, para 1-5; Sec VIII, para 71 thru 75.

TRAINING AID

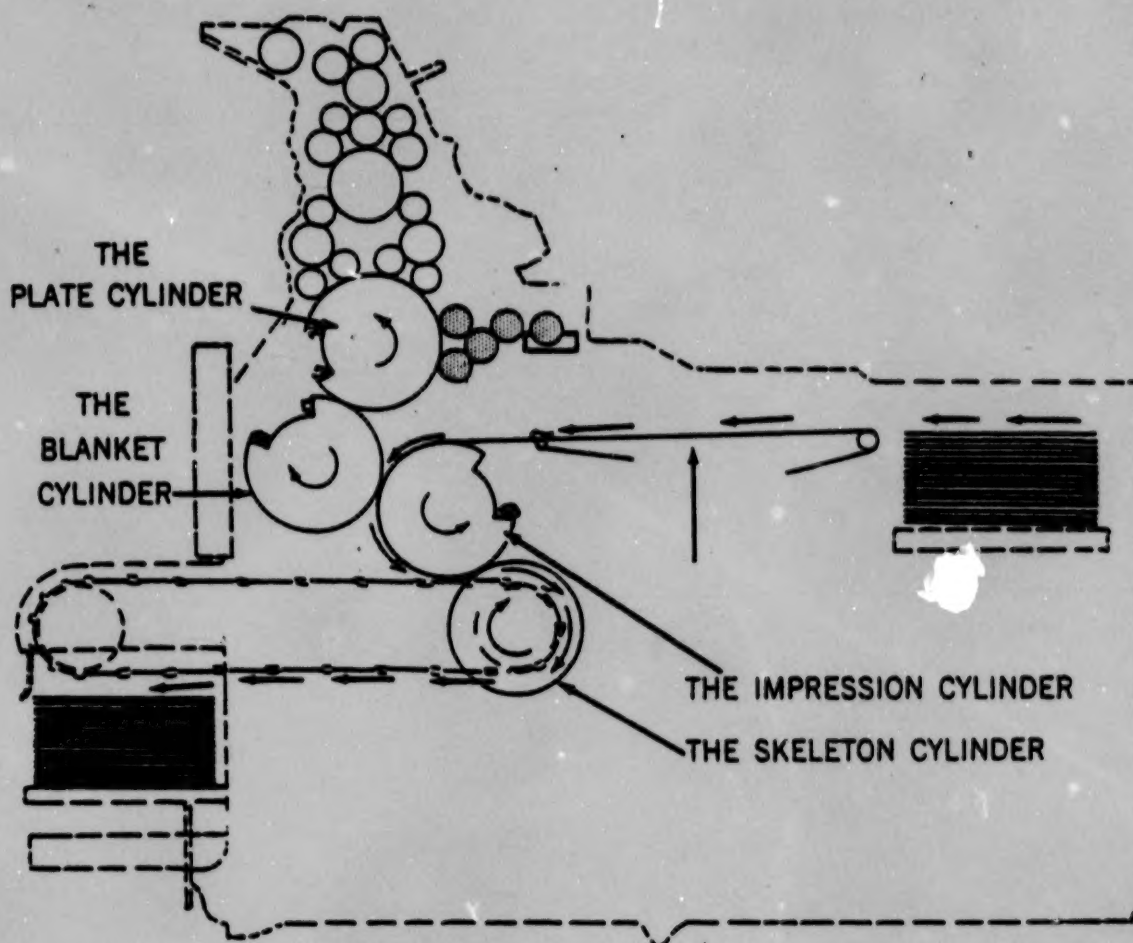


Figure 1 #A-109-57 Schematic Drawing of
a typical Offset Press

LESSON OUTLINE

LESSON: Prepare Cylinder Assembly

SUBJECT MATTER OUTLINE	INSTRUCTIONAL TACTICS
<u>INTRODUCTION</u> Up to this point you know how to operate the controls, and set up the feeder and delivery assemblies of the offset press, and successfully feed paper through the press. During this period of instruction you will learn the procedures used to properly prepare the cylinders, pack and mount a blanket and plate, obtain correct printing pressure between cylinders and finally how to remove the plate and blanket. As a result of this class, you will be able to mount a blanket and plate after selecting the proper packing needed to obtain the correct printing pressure between the blanket and impression cylinders.	Explain the importance of following the procedures taught. Use Figure 1 Training Aid #A-109-57 Schematic Drawing of an Offset Press and point out the different cylinders and explain each cylinder's function. NOTE TO INSTRUCTOR: Due to the simultaneous instruction of the three types of presses, the development of this lesson is divided into three parts, Development #1 which pertains to the ATF-DP press and Development #2, the Harris LXG Press, and Development #3 Harris L-129-BC Press. Students will be divided into groups during the demonstration, with 1 instructor demonstrating at each press.

SUBJECT MATTER OUTLINE

INSTRUCTIONAL TACTICS

DEVELOPMENT #1

ATF-DP Offset Press

1. USING A MICROMETER

a. Construction of the micrometer

- (1) Anvil
- (2) Spindle
- (3) Barrel
- (4) Thimble
- (5) Ratchet

b. Measure thickness

Show and explain the construction of micrometer and demonstrate measuring various thicknesses

Ask students questions to review construction.

After demonstrating the micrometer, change to various settings and have each student read the setting until all students understand.

Check student understanding by asking questions.

2. PREPARE CYLINDERS

a. Construction and undercuts

Explain the bearers, gutters, useable surfaces and amounts of undercuts.

b. Care and cleaning

Explain the materials used in cleaning and the reasons for keeping the cylinders clean.

3. PREPARE AND MOUNT BLANKET AND PACKING

a. Blanket construction

Explain and point out proper direction of mounting. Using an old blanket, explain procedure used.

b. Changing blanket bars

c. Check and clean blanket

Explain the materials used and reason for caring for the blanket.

SUBJECT MATTER OUTLINE	INSTRUCTIONAL TACTICS
d. "Mike" the blanket and packing e. Mounting procedures	Explain and demonstrate the miking procedures and method used to determine proper packing. Explain and demonstrate the proper mounting procedures. Ask questions to check students understanding.
BREAK AT INSTRUCTOR'S DISCRETION	
4. PREPARE AND MOUNT PLATE AND PACKING a. Parallel and center the plate clamps b. Check and clean the plate c. "Mike" the plate and packing d. Mounting procedures 5. IMPRESSION PRESSURE a. Determining setting b. Adjustment 6. REMOVAL OF THE PLATE AND BLANKET a. Plate and packing	Explain and demonstrate the procedures used. Explain the materials used and reasons for cleaning the plate. Explain and demonstrate the miking procedures and method used to determine proper packing. Explain and demonstrate the proper procedures. Check the students understanding by asking questions. Explain the necessity for changing settings and how the change is determined. Explain and demonstrate the procedure used when adjusting for proper printing pressure. Explain and demonstrate removal procedure.

SUBJECT MATTER OUTLINE	INSTRUCTIONAL TACTICS
b. Blanket and packing	Explain and demonstrate removal procedure. Check students understanding by asking questions. (Allow 2 hours for demonstration)
<u>DEVELOPMENT #2</u> Harris LXG Press 1. USING A MICROMETER a. Construction of the micrometer (1) Anvil (2) Spindle (3) Barrel (4) Thimble (5) Ratchet b. Measure thickness 2. PREPARE CYLINDERS a. Construction and undercuts b. Care and cleaning c. Check impression setting 3. PREPARE AND MOUNT BLANKET AND PACKING a. Blanket construction	At the press on pressroom floor, explain the construction of a micrometer. Demonstrate how to hold and use the micrometer, change to various settings and have each student read the thickness setting until all students understand. Stress safety. Explain the bearers, gutters, usable surfaces and amounts of undercuts. Explain the materials used in cleaning and the reasons for keeping the cylinders clean. Explain impression setting Check student understanding by asking questions. Explain and point out proper direction of mounting.

SUBJECT MATTER OUTLINE	INSTRUCTIONAL TACTICS
b. Changing blanket bars c. Check and clean blanket d. "Mike" the blanket and packing e. Mounting procedures	Using an old blanket, explain procedure used. Explain the materials used and reason for caring for the blanket. Explain and demonstrate the miking procedures and method used to determine proper packing. Explain and demonstrate the proper mounting procedures. Ask questions to check students understanding.
4. PREPARE AND MOUNT PLATE AND PACKING a. Parallel and center the plate clamps b. Check and clean the plate c. "Mike" the plate and packing d. Mounting procedures	Explain and demonstrate the procedures used. Explain the materials used and reasons for cleaning the plate. Explain and demonstrate the miking procedures and method used to determine proper packing. Explain and demonstrate the proper procedures. Check the students understanding by asking questions.
5. IMPRESSION PRESSURE a. Determining setting b. Adjustment	Explain the necessity for changing settings and how the change is determined. Explain and demonstrate the procedure used to adjust the impression handle to the proper pressure reading.

SUBJECT MATTER OUTLINE	INSTRUCTIONAL TACTICS
6. REMOVAL OF THE PLATE AND BLANKET a. Plate and packing b. Blanket and packing	Ask questions to check student understanding. Explain and demonstrate removal procedures. Explain and demonstrate removal procedures. Check student understanding by asking questions. (Allow 2 hours for demonstration)
<u>DEVELOPMENT #3</u> Harris L129 BC Press 1. USING A MICROMETER a. Construction of the micrometer (1) Anvil (2) Spindle (3) Barrel (4) Thimble (5) Ratchet b. Measure thickness 2. PREPARE CYLINDERS a. Construction and undercuts b. Care and cleaning c. Impression setting	At the press on pressroom floor, explain the construction of a micrometer. Demonstrate how to hold and use the micrometer, change to various settings and have each student read the thickness settings until all students understand. Stress safety. Explain the bearers, gutters, usable surfaces and amounts of undercuts. Explain the materials used in cleaning and the reasons for keeping the cylinders clean. Explain impression settings. Check student understanding by asking questions.

SUBJECT MATTER OUTLINE	INSTRUCTIONAL TACTICS
3. PREPARE AND MOUNT BLANKET AND PACKING a. Blanket construction b. Changing blanket bars c. Check and clean blanket d. "Mike" the blanket and packing e. Mounting procedures	Explain and point out proper direction of mounting. Using an old blanket, explain procedure used. Explain the materials used and reason for caring for the blanket. Explain and demonstrate the miking procedures and method used to determine proper packing. Explain and demonstrate the proper mounting procedures. Ask questions to check student understanding.
4. PREPARE AND MOUNT PLATE AND PACKING a. Parallel and center the plate clamps b. Check and clean the plate c. "Mike" the plate and packing d. Mounting procedures	Explain and demonstrate the procedures used. Explain the materials used and reasons for cleaning the plate. Explain and demonstrate the miking procedures and method used to determine proper packing. Explain and demonstrate the proper procedures.
5. IMPRESSION PRESSURE a. Determining setting	Explain the necessity for changing settings and how the change is determined.

SUBJECT MATTER OUTLINE	INSTRUCTIONAL TACTICS
b. Adjustment 6. REMOVAL OF THE PLATE AND BLANKET a. Plate and packing b. Blanket and packing	Explain and demonstrate the procedure used to adjust the impression handle to the proper pressure reading. Ask questions to check student understanding. Explain and demonstrate removal procedures. Explain and demonstrate removal procedures. Check student understanding by asking questions. (Allow 2 hours for demonstration)
<u>APPLICATION</u>	Student understanding was checked throughout the lesson by instructor. (See Instructional Tactics) Students are to perform Practical Exercise. (Allow 5 hours PE, 2 hour Exam and critique)
	BREAK AT INSTRUCTOR'S DISCRETION
<u>SUMMARY</u> During the last 19 hours of instruction, you utilized a micrometer to determine proper thicknesses, mounted a plate and blanket with proper packing on their respective cylinders while using correct mounting procedures.	

SUBJECT MATTER OUTLINE	INSTRUCTIONAL TACTICS
Later on, during the printing exercises, you will find that proper packing of the plate and blanket along with the correct setting of impression pressure, will greatly enhance the quality of the printed product. The plate that you have learned how to pack and mount correctly will now be utilized during the preparation of the Dampening Assembly which is your next lesson. NOTE: Have students remove blanket.	

DEMONSTRATION

LESSON: Prepare Cylinder Assembly

OBJECTIVE: To demonstrate to the student the proper procedures to prepare the cylinders for press operation for the ATF-DP, Harris LXG or Harris L-129 BC offset presses.

SUPPORT REQUIREMENTS:

1. ATF-DP, Harris LXG or Harris L-129 BC offset press - one per designated group.
2. Harris manufacturer's manuals for LXG and L-129 presses and TM 5-245 for ATF-DP press - one per press.
3. One assistant instructor per press.
4. Oil can W/OE-30 wt oil - one per press.
5. Paper micrometer - one per press.
6. Packing paper (.002, .003, .005 thick) as required for each press.
7. Offset press blanket and plate - one per press.
8. Rags, razor blades and rulers - as required for each press.
9. Press tool kit - one per press
10. Detailed procedure sheet A-1, B-1 or C-1 (Student Practical Exercise)
11. Time required - 2 hours

SUBJECT MATTER OUTLINE

The demonstration will provide the student with sufficient knowledge to prepare the cylinder assembly for press operation for the ATF-DP, LXG or L-129 BC offset presses.

DEVELOPMENTINSTRUCTIONAL TACTICS

Instructor will have students position themselves around demonstration presses so that they will be able to observe all procedures.

The development for this demonstration is also the student practical exercise (A-1, B-1 or C-1) and will be covered completely. (Use detailed procedure sheet).

The primary instructor will cover each step in a narrative manner while the assistant instructor demonstrates the steps. The primary instructor will read each caution note before assistant instructor demonstrates that step. After each major step, primary instructor will check student understanding before proceeding to the next step.

STUDENT PRACTICAL EXERCISE

LESSON: Prepare Cylinder Assembly

OBJECTIVE: During this exercise, the student will be provided an ATF-DP, LXG or L-129 offset press, blanket, plate, packing paper, micrometer, press tool kit, safety rules, TM 5-245, Harris Operating Manual and detailed procedure sheets. The student will properly clean and prepare cylinders, obtain proper thickness of packing prior to mounting the blanket and plate. The student will also explain how to obtain proper printing pressure between blanket and impression cylinder on the ATF-DP, LXG or L-129 BC offset press and know the procedure used.

STUDENT MATERIALS AND EQUIPMENT:

1. Plate and Blanket - one per press
2. Packing paper - as required per press
3. Ruler, razor blade, rags - as required per press
4. Oil can W/OE 30 oil - 1 can per press
5. Tool kit with micrometer, one per press
6. Offset press - one per designated group

SPECIAL REQUIREMENTS:

1. One assistant instructor per two designated groups during SPE
2. Time required: 2 hours per student and repeated as time allows

STUDENT REQUIREMENTS:

Be able to perform and explain all requirements in Detailed Procedure Sheet A-1, B-1 or C-1 depending on press assignment.

PREPARE CYLINDER ASSEMBLY
DETAILED PROCEDURE SHEET #1
(ATF-DP)

1. Perform a Manual and Visual Safety Check.
 2. Prepare Cylinders.
 - a. Positioning of blanket cylinder.
 - (1) Remove the cylinder guard.
 - (2) Call clear, rotate the cylinders manually and wipe all three cylinders.
 - (3) Position gripper edge of blanket cylinder to allow for mounting of blanket.
 3. Prepare Blanket and Packing.
 - a. Locate blanket.
 - (1) Check blanket for indentations, ink, and gum.
 - (2) Remove gum with water, ink with solvent, or solvent mixed with pumice powder, and check with your instructor on any other indentations noted.
 - b. Mike the blanket four inches in from blanket bars at all four corners.
 - c. Determine the average blanket thickness.
 - (1) Add the four micrometer readings together.
 - (2) Divide total by four to find the average blanket thickness.
 - d. Determine amount of packing.
 - (1) Subtract the average blanket thickness from the cylinder undercut of .071".
 - (2) Add .002" to the answer of (1) above to find the total amount of packing needed.
 - (3) Select packing accordingly and "mike" for proper thickness.
- NOTE: The total thickness of blanket and packing must exceed the .071" cylinder undercut by .002". The desired total thickness is .073".
4. Mount Blanket and Packing.
 - a. Seat the gripper edge blanket bar onto the edge of the cylinder.

NOTE: To determine the tail edge of an old blanket, look for a line across the blanket about 3 inches in from the blanket bar. For a new blanket either bar can be used for the gripper edge.

- b. Lock the bar onto the cylinder with locking bolts
- c. Call clear and manually rotate the cylinders until a 3 inch space is obtained between blanket cylinder and cylinder guard cross bar.
- d. Roll up the blanket and secure it into the obtained space, between blanket cylinder and cylinder guard cross bar.
- e. Place the packing over the edge of the cylinder and under the blanket
- f. Insure that the packing on the operator's side of the press is even with the edge of the blanket if the packing is larger than the blanket
- g. Hold the packing against the cylinder just below the center of the gripper edge with your left hand
- h. Unroll the blanket with the right hand and allow it to rest on the left arm
- i. The holding of the packing is now switched from the left hand under the blanket to the right hand controlling it from the blanket surface
- j. Call "clear" and rotate the cylinders
- k. The rotating of cylinders is stopped when the reel-rod is in position for mounting the blanket bar
- l. Turn the reel-rod until the flat edge is facing out, seat the tail edge blanket bar onto the reel-rod and secure with the locking bolts

NOTE: Allow your hand to move down firmly over the blanket surface when rotating the cylinders to the mounting position of the blankets tail end onto the reel-rod.

- m. Hold the pawl into the reel-rod ratchet and tighten the blanket with the blanket wrench
- n. Tap the portion of the blanket that is not against the cylinder with your index finger to check for a "ripe watermelon sound"
- o. Retighten and recheck blanket if necessary
- p. Call "clear" and rotate the cylinders until the gap in the plate cylinder is facing out

5. Parallel and Center Plate Clamps

a. Top plate clamps

- (1) Loosen tension screws until clamp bar can be pushed flush with the cylinder end
- (2) Move the plate clamps until the clamp is aligned with the center mark on the cylinder
- (3) Insure that the side adjustment screws are not tight against the cylinder walls

b. Bottom plate clamps

- (1) Loosen tension screws until the clamp bar rests flush with the edge of the cylinder

- (2) Insure that the side adjustment screws are not tight against The cylinder walls

6. Center The Plate Cylinder

- a. Call "clear" and rotate the cylinder forward until the first locking bolt, above the cylinder gap on the gear side of the cylinder, is accessible
- b. Using a 5/16" allen wrench, loosen the locking bolt
- c. Continue to rotate the cylinder and loosen the three remaining locking bolts
- d. Move the cylinder until the locking bolt, at the cylinder gap is centered in the slot

NOTE: It may be necessary to use a screw driver or blanket wrench handle to move the cylinder.

- e. Lock the locking bolt at cylinder gap
- f. Call "clear", rotate the cylinder and lock the three remaining locking bolts
- g. Continue to rotate the cylinder until the plate clamps are accessible

7. Prepare The Plate And Packing

- a. Check the plate for old ink, excessive amounts of gum, creases, indentations, broken images, foreign particles of any kind or anything that would cause problems during printing operations
- b. Clean plate when necessary and report all imperfections to the instructor
- c. Mike the plate in one area
- d. Select packing
 - (1) Subtract the plate thickness from the cylinder undercut of .015"
 - (2) Add .001" to answer of (1) above
 - (3) Select and mike packing in one area to correspond with answer of (2) above

8. Mount The Plate And Packing

- a. Insert the gripper edge of plate into gripper clamps insuring that the plate is centered on the usable cylinder surface
- b. Lock the plate clamps with the quion key wrench
- c. Lock-up the ink rollers
- d. Put the press on impression
 - (1) Depress operator side manual trip
 - (2) Place a paper under the trip spring
 - (3) Depress the impression - on - level
 - (4) Depress the cylinder arm

- e. Insert the packing under the plate
- f. Hold back on the plate with your right hand and manually turn the flywheel with the left to rotate the cylinders
- g. Stop when tail-end of plate is lined up over the tail clamps.
- h. Insert the tail edge of plate into the clamps and tighten quoin keys.
- i. Tighten the tail edge tension screws finger tight

NOTE: When tightening the tension screws, always work from the center out toward the sides.

- j. Using the pin wrench, tighten the tail edge tension screws until the plate is tight against the cylinder
- k. Check the tightness of the plate on the cylinder by tapping near the end of the cylinder with one of your fingers or knuckles
- l. Tighten the gripper clamp tension screws finger tight, using a pin wrench only if necessary to draw the plate tight against the cylinder
- m. Check plate tension with the fingers or knuckles

NOTE: When the hollow sound has disappeared then the plate has been tightened sufficiently - Do Not Over - Tighten, or the clamps will pull off or break the edge of the plate. Also, tighten as evenly as possible so as not to loosen the clamp and cylinder parallel.

- n. Take press off impression
 - (1) Depress manual trip on operator's side
 - (2) Remove paper from under trip spring
- o. Rotate the cylinders manually one revolution
- p. Re-check the plate tension on both edges
- q. Re-place the cylinder guard

9. Set Printing Pressure

- a. Loosen star-shaped locking device
- b. Move the impression handle up to decrease and down to increase the pressure between the blanket and impression cylinders
- c. Lock the locking device

NOTE: Although setting for proper printing pressure is only possible by viewing a printed sheet, it is necessary to know the following:

- (1) A 1/8th inch movement of the impression handle will change the distance between cylinders by approximately .001".
- (2) Over-packing the plate .001" and the blanket .002" will give the .03" printing pressure between these cylinders.
- (3) Once proper printing pressure is obtained between the blanket and impression cylinders it will only be necessary to change that

setting when a different thickness of stock is being used or a change in the amount of packing under the blanket is made.

10. Remove The Plate

- a. Remove the cylinder guard
- b. Loosen the top and bottom tension screws
- c. Release the tail edge plate clamps
- d. Remove the plate from the tail clamps
- e. Hold the plate and packing with the right hand while manually rotating the press with the left hand until the gripper edge clamps are accessible.
- f. Loosen the gripper edge plate clamps and remove the plate and packing

11. Remove The Blanket

- a. Place your finger on the ratchet pawl to release it from the ratchet
- b. Using the blanket wrench on the reel rod nut, push down on the wrench to allow the pawl to release from the ratchet
- c. Remove the reel rod blanket bar locking bolts
- d. Hold blanket and packing with the right hand while rotating the cylinders with the left hand until the gripper-edge-blanket bar is accessible.
- e. Remove the packing
- f. Loosen the gripper edge blanket bar locking bolts
- g. Remove the blanket
- h. Replace the cylinder guard

CYLINDER ASSEMBLY
OUTLINED PROCEDURE SHEET #1
(ATF-DP)

1. Make a visual and manual safety check.
2. Remove cylinder guard and clean cylinder and bearer surfaces.
3. Check and clean blanket.
4. Mike blanket on four corners and packing in one area.
5. Attach gripper edge of blanket to cylinder.
6. Insert packing and rotate cylinder.
7. Attach and tighten tail edge of blanket on the reel rod.
8. Check blanket tension and packing position.
9. Center plate cylinder.
10. Parallel and center plate clamps.
11. Check and clean plate.
12. Mike plate and packing in one area.
13. Insert gripper edge of plate and lock gripper clamps.
14. Lock up ink rollers and put press on impression.
15. Place packing behind plate and rotate cylinder.
16. Insert tail edge of plate and lock clamps.
17. Tighten tail edge tension screws.
18. Finger tighten gripper edge tension screws. If the use of a pin wrench is necessary to take up all slack in the plate, tighten all tension screws as evenly as possible.
19. Take press off impression and manually rotate cylinders one complete revolution.
20. Recheck and retighten tension screws if necessary.
21. Replace the cylinder guard.
22. Remove cylinder guard, remove plate and blanket in reverse order of installation and replace the cylinder guard.

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740-303-A-020-021

PREPARE CYLINDER ASSEMBLY
DETAILED PROCEDURE SHEET #2
(HARRIS-LXG)

1. Prepare Blanket Cylinder

a. Positioning of cylinder

- (1) Remove cylinder guard and open gear side door
- (2) Call clear, rotate cylinders manually and clean cylinders and bearers
- (3) Position gripper edge of blanket cylinder to allow for mounting of blanket

2. Prepare Blanket And Packing

a. Locate blanket

- (1) Check blanket for indentations, ink and gum
- (2) Remove gum with water and ink with solvent or solvent and pumice powder and check with an instructor on any other indentations noted

b. Mike the blanket four inches in from blanket bars on all four corners

c. Determine the average blanket thickness

- (1) Add the four "mike" readings together
- (2) Divide total by four to find the average blanket thickness

d. Determine amount of packing

- (1) Subtract the average blanket thickness from the cylinder undercut of .075"
- (2) Add .003" to the answer of (1) above to find the total amount of packing needed
- (3) Select packing accordingly and "mike" for proper thickness

3. Set Printing Pressure

- a. Open operator side door and loosen blanket cylinder locking bolts on
- b. Move the impression handle to set the indicator dial on "0" setting
- c. Move the impression handle up to decrease and down to increase the pressure between the blanket and impression cylinders
- d. Lightly tighten the lock bolts after setting for proper printing pressure according to the thickness of "stock" being run
- e. Close operator side door

4. Mount The Blanket And Packing

- a. Loosen the gripper edge blanket bar lock screws
- b. Seat the gripper edge blanket bar onto the gripper edge of cylinder

NOTE: To determine the tail edge of an old blanket, look for a line across the blanket about 3 inches in from the bar. For a new blanket either bar can be used for the gripper edge.

- c. Lock the bar onto the cylinder with lock screws
- d. Call clear and manually rotate the cylinder until the gripper edge blanket bar is approximately three inches from the gripper clamps on the plate cylinder
- e. Roll up the blanket and securely place it into the space between the blanket and plate cylinders to obtain a gap between the blanket and the gripper end of the blanket cylinder
- f. Square the pre-cut packing sheets with the blanket and place them to overlap the leading edge of the cylinder so they will not slip while
- g. Insure the packing on the operators side of the press is even with the edge of the blanket
- h. Hold the packing against the cylinder with the left hand just below the gripper edge of the cylinder center
- i. Unroll the blanket with the right hand and allow it to rest on the left arm
- j. Change the holding of packing over to the right hand
- k. Call "clear" and rotate the cylinders with the left hand and as the cylinders rotate move your right hand down over the blanket surface
- l. Stop rotating the cylinders when the reel rod is in position for mounting the blanket bar
- m. Turn the reel rod until the flat edge is facing out and place the blanket wrench on the reel rod nut
- n. Seat the tail edge of blanket on reel rod and secure with lock screws
- o. Hold both pawls into the reel rod ratchet and tighten the blanket with the blanket wrench
- p. Tap the blanket with the index finger to check for a "ripe watermelon sound"
- q. Re-tighten and re-check blanket if necessary
- r. Call clear and rotate the cylinders until the gap in the plate cylinders is facing out

5. Parallel And Center Plate Clamps

- a. Top plate clamps
 - (1) Loosen tension screws until clamp bar can be pushed flush with the cylinder end
 - (2) Move the plate clamps until the center mark on the clamp bar is aligned with the center mark on the cylinder

b. Bottom plate clamps

- (1) Loosen tension screws until the clamp bar can be pushed flush with edge of the cylinder
- (2) Using the side adjusting screws, center the clamps on the clamp bar

6. Center the Plate Cylinder

- a. Call clear and rotate the cylinders manually until the planetary gear scale is facing forward
- b. Loosen the three cap screws
- c. Rotate the planetary gear with the cylinder wrench until the indicator dial is over the last mark on the top of the scale
- d. Lock the cap screws

7. Prepare the Plate and Packing

- a. Measure the plate and cut to 27 inches
- b. Check the plate for old ink, excessive amounts of gum, creases, indentations, broken images, foreign particles of any kind and anything that would cause problems during printing operations
- c. Clean plate when possible and report all imperfections to the instructor
- d. "Mike" the plate in one area
- e. Select packing
 - (1) Subtract the plate thickness from the cylinder undercut of .015"
 - (2) Select and "mike" packing to correspond with answer of (1) above

8. Mount the Plate and Packing

- a. Insert the gripper edge of plate into gripper clamps insuring the plate is centered on the usable cylinder surface
- b. Lock the plate clamps with the pin wrench
- c. Pull the ink roller control handle out and turn it to hold the pin out of the slide
- d. Move the feeder latch handle forward until fully engaged
- e. Insert the packing behind the plate
- f. Hold back on the plate with the right hand, turn the cylinder with the left hand using the ratchet wrench
- g. Stop rotating the cylinders when the tail clamps are positioned to allow the buckle of the plate to hold the plate into the clamps after insertion
- h. Insert the tail edge of the plate into the tail clamps
- i. Check the plate to insure that it is seated against the blocks and lock the clamps with the pin wrench
- j. Tighten the tail clamp tension screws finger tight

NOTE: A buckle in the plate between the tail clamps indicates tension screws not tightened evenly.

- k. Using the pin wrench, tighten the tail edge tension screws, until the plate is tight against the cylinder
- l. Check the tightness of the plate on the cylinder by tapping the plate near the end of the cylinder with one of your fingers or knuckles
- m. Tighten the gripper clamp tension screws finger tight
- n. Using the pin wrench, tighten the gripper edge tension screws until the plate is tight against the cylinder
- o. Check plate tension with fingers or knuckles

NOTE: When the hollow sound has disappeared, the plate has been sufficiently tightened. Do Not Over-Tighten or the clamps will pull off the plate and the edge of the plate may break.

- p. Depress the trip button
- q. Rotate the cylinder manually one revolution
- r. Re-check the plate tension on the gripper and tail edge
- s. Re-place the cylinder guard

9. Remove the Plate

- a. Remove the cylinder guard
- b. Loosen the top and bottom tension screws
- c. Release the tail edge plate clamps
- d. Remove the plate from the clamps
- e. Hold the plate and packing with the right hand while manually rotating the press with the left hand until the gripper edge clamps are accessible
- f. Loosen the gripper edge plate clamps and remove the plate and packing

10. Remove the Blanket

- a. Place your fingers on the ratchet pawls and get ready to release them from the ratchet
- b. Engage the blanket wrench on the reel rod nut, then push down on the wrench this will allow the pawl's to be released from the ratchet
- c. Remove the reel rod blanket bar lock screws
- d. Hold the blanket and packing with the right hand while rotating the cylinders with the left hand until the blanket bar, at the gripper edge is accessible
- e. Remove the packing
- f. Loosen the gripper edge blanket bar lock screws
- g. Remove the blanket
- h. Re-place the cylinder guard and close gear side door

CYLINDER ASSEMBLY

OUTLINED PROCEDURE SHEET #2

(LXG)

1. Make a visual and manual safety check.
2. Remove guard and clean cylinder and bearer surfaces.
3. Check and clean blanket.
4. Set printing pressure (stock thickness).
5. Mike the blanket on four corners and packing in one area.
6. Attach gripper edge of blanket to cylinder.
7. Insert packing and rotate cylinder.
8. Attach and tighten tail edge of blanket on the reel rod.
9. Check blanket tension and packing position.
10. Parallel and center plate clamps.
11. Measure and cut plate to 27 inches.
12. Check and clean plate.
13. Mike the plate and packing in one area.
14. Insert gripper edge of plate and lock gripper clamps.
15. Place ink roller control handle in manual position and put press on impression.
16. Place packing behind plate and rotate cylinders.
17. Insert tail edge of plate and lock clamps.
18. Tighten tail edge tension screws.
19. Finger tighten gripper edge tension screws. If the use of a pin wrench is necessary to take up all slack in the plate, tighten all tension screws as evenly as possible.
20. Take press off impression and manually rotate cylinders one complete revolution.
21. Recheck and retighten tension screws where and if necessary.
22. Replace the cylinder guard.
23. Remove cylinder guard, remove plate and blanket in reverse order of installation and replace the cylinder guard.

PREPARE CYLINDER ASSEMBLY
DETAILED PROCEDURE SHEET #3
(Harris L-129 B/C)

1. Make A Manual And Visual Safety Check.
2. Use the Micrometer
3. Preparation of Cylinders

- a. Depress ready buttons and call clear
- b. Jog press and clean all three cylinders

NOTE: Do Not jog press and wipe at same time, jog press and wipe then jog again.

- c. Position blanket cylinder so that the gripper edge of blanket can be mounted.

4. Set Stock Thickness Adjustment

- a. Check to be sure press is off impression.
- b. Insert the handle into the most accessible hole in the stock thickness adjustment and rotate in the direction of the stock to be run is indicated on the dial. This setting is always on the upper numbers from zero.

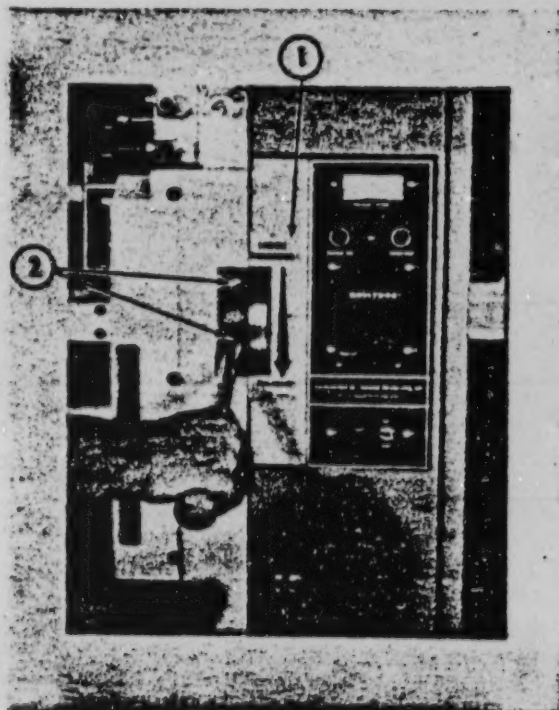
5. Prepare Blanket And Packing

- a. Locate blanket

- (1) Check blanket for indentations, ink and gum
- (2) Remove gum with water and ink with solvent or solvent and pumice powder and check with an instructor on any other indentations noted.

- b. Mike the blanket four inches in from blanket bars on all four corners
- c. Determine the average blanket thickness

- (1) Add the four "mike" readings together.
- (2) Divide total by four to find the average blanket thickness.



Stock Thickness Adjustment

d. Determine amount of packing

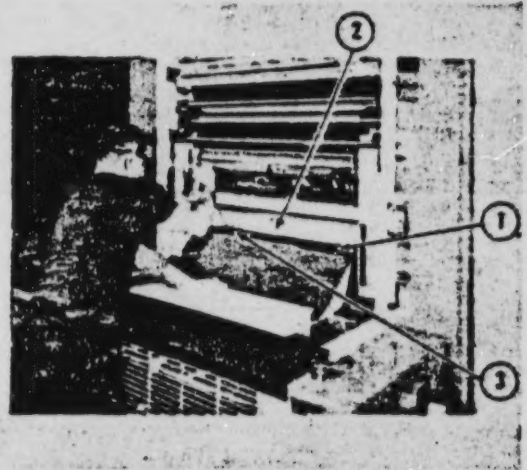
- (1) Subtract the average blanket thickness from the cylinder undercut of .075
- (2) Add .003 to the answer of (1) above to find the total amount of packing needed.
- (3) Select packing accordingly and "mike" for proper thickness

Installation of Blanket

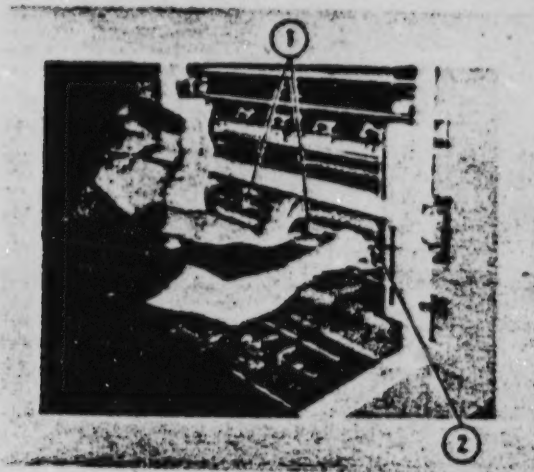
6. Mount The Blanket And Packing

- a. Loosen the gripper edge blanket bar lock screws
- b. Seat the gripper edge blanket bar onto the gripper edge of the cylinder

NOTE: To determine the tail edge of an old blanket, look for a line across the blanket about 3 inches in from the bar. For a new blanket either bar can be used for the gripper edge.



- c. Lock the blanket bar onto the cylinder with the lock screws, making sure the bar is fully seated.
- d. Call clear and inch the press until the gripper edge of the blanket is approximately two inches below the safety guard.
- e. Hang tail end of the blanket over the hand rail on the ink fountain. Ink fountain must be in swing open position.
- f. Square the precut packing sheets with the blanket and place them to overlap the leading edge of the cylinder so they will not slip while running.
- g. Remove the tail end of the blanket from the hand rail and roll about two thirds of the blanket into a tight roll, pull down on the blanket, making sure the packing stays in place and inch the press and unroll the blanket on the cylinder.
- h. Stop with the reel rod approximately three inches below the safety guard.
- i. Place the left hand on the blanket surface and hold some tension on the blanket while attaching the blanket bar to the reel rod.
- j. Tighten the blanket by using the 9/16" T-wrench.
- k. Tap the blanket with the index finger to check for a "ripe watermelon sound".



Tightening Blanket on Cylinder

7. Parallel and Center Plate Clamps

a. Top plate clamps

- (1) Loosen tension screws until clamp bar can be pushed flush with the cylinder end.
- (2) Move the plate clamps until the center mark on the clamp bar is aligned with the center mark on the cylinder.
- (3) Using a 1/8" spacer as a guide, turn top tension screws until spacer can be inserted between top plate clamp bar and cylinder.

b. Bottom plate clamps

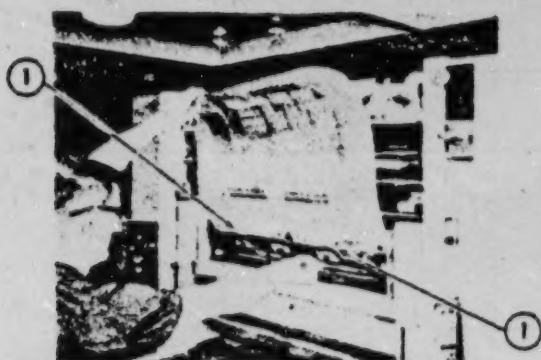
- (1) Loosen tension screws until the clamp can be pushed flush with edge of the cylinder
- (2) Using the side adjusting screws, center the clamps on the clamp bar.

8. Prepare the Plate and Packing

- a. Measure the plate and cut to 27½ inches.
- b. Check the plate for old ink, excessive amounts of gum, creases
- c. Clean plate when possible and report all imperfections to the instructor.
- d. "Mike" the plate in one area.
- e. Select packing
 - (1) Subtract the plate thickness from the cylinder undercut of .015".
 - (2) Select and "mike" packing to correspond with answer of (1) above.

9. Mount the Plate and Packing

- a. Place the form roll control handle in the "off" position
- b. Move the feeder latch handle forward until fully engaged and rotate the press one full turn.
- c. Insert the gripper edge of the plate into gripper clamps insuring the plate is centered on the usable cylinder surface.
- d. Lock the plate clamps with the pin wrench.
- e. Insert the packing behind the plate.



Installing Plate

- f. Depress ready buttons; can call clear.
- g. Hold back on the plate with the right hand; jog the cylinder around
- h. Stop rotating the cylinders when the tail clamps are positioned to allow the buckle of the plate to hold the plate into the clamps after insertion.
- i. Insert the tail edge of the plate into the tail clamps.
- j. Check the plate to insure that it is seated against the blocks and lock the clamps with the pin wrench.
- k. Tighten the tail clamp tension screws finger tight.

NOTE: A buckle in the plate between the tail clamps indicates tension screws not tightened evenly.

- l. Using the pin wrench, tighten the tail edge tension screws until the plate is tight against the cylinder.
- m. Check the tightness of the plate on the cylinder by tapping the plate near the end of the cylinder with one of your fingers or knuckles.
- n. Depress the trip button.
- o. Inch the press one revolution to relieve pressure between cylinders
- p. Check tension on plate, both gripper and tail edge. If slack remains tighten tensions screws on tail end again.

NOTE: All slack should be removed with tension screws from tail end.
Tighten gripper tension screws finger tight.

NOTE: When the hollow sound has disappeared, the plate has been sufficiently tightened. Do not overtighten or the clamps will pull off the plate and the edge of the plate may break.

10. Remove the Plate

- a. Loosen the bottom tension screws.
- b. Release the tail edge plate clamps.
- c. Remove tail edge from the clamps.
- d. Holding the plate and packing in your right hand, depress the ready button, call clear and inch the press using the reverse button (Caution use of reverse button only).
- e. Loosen the gripper edge plate clamps and remove the plate and packing.

11. Remove The Blanket

- a. Using a 9/16" T-wrench loosen the tension.
- b. Remove the reel rod screws, or tighten to avoid them hitting the cylinders.
- c. Hold the blanket and packing with the right hand, "call clear", and inch the press in reverse until the gripper edge is in the proper position for removal of the lock screws.
- d. Remove the packing.
- e. Loosen gripper edge lock screws.
- f. Remove the blanket and place in drawer for blanket.
- g. Tighten gripper edge lock screws.

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740-303-A-020-020

CYLINDER ASSEMBLY
OUTLINE PROCEDURE SHEET #3

1. MAKE A VISUAL AND MANUAL SAFETY CHECK.
2. USE OF THE MICROMETER.
3. CLEAN CYLINDERS AND BEARERS.
4. SET STOCK THICKNESS ADJUSTMENT.
5. PREPARE BLANKET AND PACKING.
6. MOUNT THE BLANKET.
7. PARALLEL AND CENTER THE PLATE CLAMPS.
8. PREPARE THE PLATE AND PACKING.
9. MOUNT THE PLATE.
10. REMOVE THE PLATE.
11. REMOVE THE BLANKET.

254

E-17

PRACTICAL EXERCISE GRADING SHEET

NAME

POSTER NO.

STARTING TIME

FINISH TIME

GRADE

DATE

GRADE

MANNER OF PERFORMANCE FOR PREPARATION OF CYLINDER ASSEMBLY

LXG OFFSET PRINTING PRESS

WTS PER CRS

1. CLEANING OF CYLINDER SURFACES AND BEARERS

12

2. READING THE MICROMETER (Set the micrometer and have the student read the setting)

8

3. BLANKET CYLINDER PROCEDURE

a. Determination of average thickness

13

b. Determination and selection of packing

9

c. Mounting of blanket

12

d. Removal of blanket

8

4. IMPRESSION ON PROCEDURES

a. Locking the ink roller handle

6

b. Use of feeder latch handle

6

5. PLATE CYLINDER PROCEDURES

a. Preparation for mounting plate

18

b. Preparation of plate and determination of packing

12

c. Mounting of plate

20

d. Removal of impression

7

e. Removal of plate

7

6. PRINTING PRESSURE ADJUSTMENT (Explain)

12

7. OBSERVANCE OF SAFETY REGULATIONS

/1/2/3/4/5/6/7/8/ X 5 points each

8. PRESS TECHNIQUES

/1/2/3/4/5/6/7/8/ X 2 points each

TOTAL

150

(LXG)
PRACTICAL EXERCISE TEST
CYLINDER ASSEMBLY
INSTRUCTORS CUT SHEET

STUDENT TIME ALLOWED: 01:50 minutes

INSTRUCTORS TIME ALLOWED: 10 minutes

1. Failed to clean the blanket cylinder -4
Failed to clean the plate cylinder -4
Failed to clean the impression cylinder -4
2. Yes or No
3. Allow .001" tolerance for micrometer readings.
 - a. Failed to mike blanket in four areas. -4
Failed to mike blanket 3 to 4 inches from the blanket bar. -4
Was not able to determine average blanket thickness. -5
 - b. Failed to mike the packing in at least one area. -4
Was not able to determine proper packing thickness. -5
 - c. Mounted blanket on reel rod first. -4
Failed to secure locking screws. -3
Failed to obtain proper tension. -5
 - d. Yes or No
4. a. Yes or No
b. Yes or No
5. Allow .001" tolerance for micrometer readings.
 - a. Parallel plate clamps. -6
Center plate clamps. -6
Center plate cylinder. -6
 - b. Check and clean plate. -2
Micrometer reading of plate. -5
Micrometer reading of packing. -5
 - c. Proper insertion of plate into clamps. -5
Position of plate on cylinder. -5
Tension of plate on gripper edge. -5
Tension of plate on tail edge. -5
 - d. Yes or no
 - e. Yes or No
6. Did not know change of blanket packing constitutes change of impression pressure. -4
Did not know change of stock thickness constitutes change of impression pressure. -4
Did not know which way impression handle moves to increase pressure. -4

PRACTICAL EXERCISE GRADING SHEET

NAME

ROSTER NO.

STARTING TIME

FINISH TIME

GRADE

DATE

GRADE

MANNER OF PERFORMANCE FOR PREPARATION OF CYLINDER ASSEMBLY

ATF-DP OFFSET PRINTING PRESS

PTS PER CR

1. CLEANING OF CYLINDER SURFACES AND BEARERS

9

2. READING THE MICROMETER (Set the micrometer and have student read the setting)

8

3. BLANKET CYLINDER PROCEDURES

a. Determination of average thickness

11

b. Determination and selection of packing

8

c. Mounting of blanket

10

d. Removal of blanket

8

4. IMPRESSION ON PROCEDURES

a. Blocking the automatic trip

6

b. Locking the ink rollers

6

c. Use of impression throw-on lever

6

d. Bringing the cylinders into contact

6

5. PLATE CYLINDER PROCEDURES

a. Preparation for mounting plate

18

b. Preparation of plate and determination of packing

12

c. Mounting of plate

16

d. Removal of impression

7

e. Removal of plate

7

6. PRINTING PRESSURE ADJUSTMENT (Explain)

12

7. Observance of Safety Regulations

/1/2/3/4/5/6/7/8 X 5 points each

8. Press Techniques

/1/2/3/4/5/6/7/8 X 2 points each

TOTAL

150

245

(ATF-DP)
PRACTICAL EXERCISE TEST
CYLINDER ASSEMBLY
INSTRUCTORS CUT SHEET

STUDENT TIME ALLOWED: 01:50 minutes

INSTRUCTORS TIME ALLOWED: 10 minutes

1. Failed to clean blanket cylinder -3
Failed to clean plate cylinder -3
Failed to clean impression cylinder -3
2. Yes or No
3. Allow .001" tolerance for micrometer readings.
 - a. Failed to mike blanket in four areas -3
Failed to mike blanket 3 to 4 inches from the blanket bar -3
Was not able to determine average blanket thickness -5
 - b. Failed to mike packing in at least one area -3
Was not able to determine proper packing thickness -5
 - c. Mounted blanket on reel rod first -3
Failed to secure locking screws -2
Failed to obtain proper tension -5
 - d. Yes or No
4.
 - a. Yes or No
 - b. Yes or No
 - c. Yes or No
 - d. Yes or No
5. Allow .001" tolerance for micrometer readings.
 - a. Parallel plate clamps -6
Center plate clamps -6
Center plate cylinder -6
 - b. Check and clean plate -2
Micrometer reading of plate -5
Micrometer reading of packing -5
 - c. Proper insertion of plate into clamps -4
Position of plate on cylinder -4
Tension of plate on gripper edge -4
Tension of plate on tail edge -4
 - d. Yes or No
 - e. Yes or No
6. Did not know change of blanket packing constitutes change of impression pressure. -4
Did not know change of stock thickness constitutes change of impression pressure. -4
Did not know which way impression handle moves to increase pressure. -4

246

ROSTER NO.

FINISH TIME

DATE _____

GRADE

261

WTS	FEN	CRS
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12

8

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13

1

12

8

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6

6

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18

12

20

7

7

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[illegible]

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TOTAL	150
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51

262

247

L-129-8C
PRACTICAL EXERCISE TEST
CYLINDER ASSEMBLY
INSTRUCTORS CUT SHEET

STUDENT TIME ALLOWED: 01:50 minutes

INSTRUCTORS TIME ALLOWED: 10 minutes

1. Failed to clean the blanket cylinder -4
Failed to clean the plate cylinder -4
Failed to clean the impression cylinder -4
2. Yes or No
3. Allow .001" tolerance for micrometer readings.
 - a. Failed to mike blanket in four areas. -4
Failed to mike blanket 3 to 4 inches from the blanket bar. -4
Was not able to determine average blanket thickness. -5
 - b. Failed to mike the packing in at least one area. -4
Was not able to determine proper packing thickness. -5
 - c. Mounted blanket on reel rod first. -4
Failed to secure locking screws. -3
Failed to obtain proper tension. -5
 - d. Yes or No
4.
 - a. Yes or No
 - b. Yes or No
5. Allow .001" tolerance for micrometer readings.
 - a. Parallel plate clamps. -6
Center plate clamps. -6
Check the printing pressure adjustment. -6
 - b. Check and clean plate. -2
Micrometer reading of plate. -5
Micrometer reading of packing. -5
 - c. Proper insertion of plate into clamps. -5
Position of plate on cylinder. -5
Tension of plate on gripper edge. -5
Tension of plate on tail edge. -5
 - d. Yes or No
 - e. Yes or No
6. Did not know change of blanket packing constitutes change of impression pressure. -4
Did not know change of stock thickness constitutes change of impression pressure. -4
Did not know which way impression handle moves to increase pressure. -4

EXAMINATION SUPPORT SHEET

LESSON: Prepare cylinder assembly

OBJECTIVE: The student will be examined to:

- a. Determine his/her ability to prepare cylinders for press operation.
- b. Determine his/her knowledge of the impression-on procedure, and an explanation of printing pressure adjustment.

STUDENT MATERIALS AND EQUIPMENT:

1. Plate and blanket - one per press
2. Packing paper - as required per press
3. Ruler, razor blade, rags - as required per press
4. Oil can w/OE 30 oil - 1 can per press
5. Press tool kit with micrometer - one per press
6. Offset press - one per designated group

SPECIAL REQUIREMENTS:

1. One assistant instructor per two designated groups
2. Time requirements: Two hours per student

ADMINISTRATIVE INSTRUCTIONS:

1. This is a combination examination. It combines performance tasks to determine if the student can prepare the cylinders for press operation, along with verbal responses to determine if the student knows how to set printing pressure adjustments.

2. One hour and 45 minutes should be allowed to complete this exam and 15 minutes for the assistant instructor to grade and critique each student.

3. Exam grade sheets are located in the Division office and are identified as Practical Exercise Grading Sheet A-1, B-1 or C-1 Lesson 740-303-A-020-020. The same grade sheet is used for all classes.

SOURCE MATERIALS

LESSON: Prepare Cylinder Assembly

LESSON OUTLINE DEVELOPMENT #1 (ATF-DP Offset Press)

1. Using a Micrometer
 - a. Manufacturer's Information Sheet
 - b. Manufacturer's Information Sheet
2. Prepare Cylinders - TM 5-245
 - a. Paragraph 8-16b (1)(2)
 - b. Paragraph 8-16a (2)
3. Prepare and Mount Blanket and Packing - TM 5-245
 - a. Paragraph N/A - Manufacturer's Information Sheet
 - b. Paragraph 8-16c (1)(b)
 - c. Paragraph 8-16c (1)(a)
 - d. Paragraph 8-16b (2)(3)
 - e. Paragraph 8-16c (2)
4. Prepare and Mount Plate and Packing - TM 5-245
 - a. Paragraph N/A - Necessary starting point for learning. (Experience)
 - b. Paragraph N/A - Necessary starting point for learning. (Experience)
 - c. Paragraph N/A - Not referenced but a necessary step. (Experience)
 - d. Paragraph 8-16d (2)
 - e. Paragraph 8-16d
5. Impression Pressure - TM 5-245
 - a. Paragraph 8-16e (1)
 - b. Paragraph 8-16e (2)
6. Removal of Plate and Blanket - TM 5-245
 - a. Paragraph 8-16d (10)
 - b. Paragraph 8-16c (2)(h)

LESSON OUTLINE DEVELOPMENT #2 (Harris LXG Offset Press)

1. Using a Micrometer
 - a. Manufacturer's Information Sheet
 - b. Manufacturer's Information Sheet

2. Prepare Cylinders
 - a. Harris Manufacturer's Manual, paragraphs 71, 73 and 74
 - b. Paragraph N/A - TM 5-245, paragraph 8-16a (2)
3. Prepare and Mount Blanket and Packing
 - a. Paragraph N/A - Manufacturer's Information Sheet
 - b. Harris Manufacturer's Manual, paragraph 72i
 - c. Paragraph N/A - TM 5-245, paragraph 8-16c (1)(a)
 - d. Harris Manufacturer's Manual, paragraph 71
 - e. Harris Manufacturer's Manual, paragraph 71
4. Prepare and Mount Plate and Packing - Harris Manufacturer's Manual
 - a. Paragraph N/A - Necessary starting point for learning. (Experience)
 - b. Paragraph N/A - Necessary starting point for learning. (Experience)
 - c. Paragraph N/A - This step is necessary due to the over-sized plates.
 - d. Paragraph N/A - Not referenced but a necessary step. (Experience)
 - e. Paragraph 73
 - f. Paragraph 73
5. Impression Pressure - Harris Manufacturer's Manual
 - a. Paragraph 74
 - b. Paragraph 74
6. Removal of Plate and Blanket - TM 5-245
 - a. Paragraph 8-16d (10)
 - b. Paragraph 8-16c (2)(h) Reference to three bolts will change to read two screws for the Harris press.

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LESSON REFERENCE FILE

CYLINDER ASSEMBLY

T.440-106



OCTOBER 1969

US ARMY ENGINEER SCHOOL - FORT BELVOIR, VIRGINIA

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TABLE OF CONTENTS

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ANNEX A	-	None
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ANNEX C	-	Student Practical Exercise

NOTE: This LRF serves as the source of information for all lessons taught on this subject, though length, methods, and objectives will vary with courses. The specific length, methods, and objectives will be determined by the POI and so reflect in ILPs.

This publication supersedes LRF, T.012-5 (5-67),
THE CYLINDER ASSEMBLY.

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SECTION I
LESSON SUPPORT REQUIREMENTS

SUBJECT: Offset Press Operation

LESSON: The Cylinder Assembly

TRAINING AIDS AND DEVICES:

1. D. A. Training Aids: None
2. Service Training Aids:

A 109 57 USA Mock-up Model of Micrometer

MATERIALS AND SUPPLIES:

1. Offset press plate
2. Offset press blanket
3. Blanket packing paper

EQUIPMENT:

1. Offset press
2. Offset press tools

FACILITIES:

1. Classroom: Equipped with desks, blackboard and overhead projector.
2. Training Area Facilities: Offset press practical exercise area.

TRANSPORTATION: None

ADDITIONAL PERSONNEL AND DEMONSTRATION TROOPS:

1. Assistant Instructor(s): One instructor required for each two presses.
2. Demonstration Troops: None

TEXT REFERENCES:

1. Required References:
 - a. TM 5-245 (Sep 62), Map Reproduction.
 - b. TM 5-3610-202-15 (Mar 63), Printing Press Offset Cylinder-Rotary.

c. Operating Manual, Harris Offset Press, Model LXG.

2. Excerpted References:

Excerpts from the Operating Manual, Harris Offset Press, Model LXG are printed with the expressed permission of the Harris Intertype Corporation for use by military personnel.

SECTION II

LESSON OUTLINE

SUBJECT: Offset Press Operation

LESSON: The Cylinder Assembly

TIME PERIOD (TOTAL): 19 Hours

TYPE OF LESSON: Lecture (2 hours), Demonstration (2 hours), Practical Exercise (15 hours)

OBJECTIVE(S): To provide the student with a qualified knowledge of the nomenclature and operation of the plate, blanket, and impression cylinders; safety precautions that apply; graded exercise and critique.

SUPPORT REQUIREMENTS: Refer to SECTION I

STUDENT REFERENCES: Refer to Schedule of Instruction

INTRODUCTION

00:00 The previous lesson covered the controls, feeder and delivery assemblies. This lesson will cover another phase of press operation, the cylinder assembly. The impression cylinder grasps the pre-positioned sheet at the front guides and carries it into contact with the blanket cylinder. Meanwhile, a plate mounted on the plate cylinder receives ink and its image is transferred to a rubber blanket mounted on the blanket cylinder. The blanket transfers or offsets the image to the sheet of paper which is on the impression cylinder. The impression cylinder then continues around and releases the printed sheet to the delivery assembly. It is essential that every pressman thoroughly understands this assembly.

DEVELOPMENT

00:03 1. CLEANING THE PLATE AND CYLINDERS

a. Cleaning the plate

- (1) Clean gum off the plate with water
- (2) Remove dried ink
- (3) Never use a sharp pointed instrument
- (4) Do not allow water on the image side of the plate

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b. Cleaning the cylinder surfaces and bearers

- (1) Remove gum with water, remove ink with solvent
- (2) Remove rust with crocus cloth and oil
- (3) Remove dirt on the cylinders

00:05 2. PACKING THE BLANKET AND PLATE CYLINDERS

a. Cylinder undercuts

b. Cylinder packing

- (1) Pack blanket .002" above bearers or .073"
- (2) Pack plate .001" above the bearers or .016"
- (3) Tolerance of .0015

c. Using the micrometer

- (1) Use to measure thickness of plate and blanket accurately
- (2) Accurate to .0001"
- (3) Thimble
- (4) Barrel

d. Measuring the thickness of a blanket and plate

00:15 3. PREPARING AND MOUNTING THE BLANKET AND PLATE

a. Putting bars on a new blanket

- (1) New blanket
- (2) Punch blanket

b. Mounting a blanket

- (1) Mike and select packing for blanket
- (2) Mount blanket bars to blanket cylinder
- (3) Tighten blanket on cylinder

c. Mounting a plate

- (1) Mike plate
- (2) Insert plate into clamps
- (3) Remove plate

00:20 4. IMPRESSION CYLINDER

a. Construction

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- (1) Has no bearers
- (2) Cylinder grippers

b. Adjustment

00:25 5. IMPRESSION

a. Impression trips

- (1) Manual trips
- (2) Automatic trips

b. Counter

00:35 6. REGISTER ADJUSTMENTS OF THE PLATE CYLINDER

a. Twisting the plate

- (1) Always twist before swinging cylinder
- (2) How to twist

b. Swinging the plate cylinder

c. Changing the image size

- (1) Image larger
- (2) Image smaller

(QUESTIONS AND COMMENTS PERIOD)

SUMMARY

- 00:45
1. Cleaning the Plate and Cylinders
 2. Packing the Blanket and Plate Cylinders
 3. Preparing and Mounting the Blanket and Plate
 4. Impression Cylinder
 5. Impression
 6. Register Adjustments of the Plate Cylinder
 7. Tie-in to Demonstration

00:50 BREAK

NOTE: The students will now move to the pressroom for a demonstration on the ATF Chief 29 DP offset press.

INTRODUCTION

01:00 During the last hour of instruction, the nomenclature and operation of the cylinder assembly was explained. During the next hour the student will see a demonstration of the operation, function and adjustment

of the cylinder assembly. It is very important that each student pay strict attention to this demonstration, because in the block of instruction which follows this demonstration, each student will be called upon to operate and make adjustments on the cylinder assembly.

During the demonstration look for the answers to the following questions.

1. What do we use to clean gum off the cylinders?
2. What is the undercut of the plate cylinder?
3. Does the impression cylinder have bearers?

DEVELOPMENT

- 01:02 7. PREPARING AND MOUNTING A BLANKET
- a. Mounting a new blanket
b. Mounting a used blanket
- 01:15 8. MOUNTING A PLATE
- 01:25 9. TWISTING THE PLATE
- 01:35 10. SWINGING THE PLATE CYLINDER
- 01:40 11. CRITIQUE

- a. Repose key questions
b. Clarify any misconceptions

(QUESTIONS AND COMMENTS PERIOD)

SUMMARY

- 01:45 1. Preparing and Mounting a Blanket
2. Mounting a Plate
3. Twisting the Plate
4. Swinging the Plate Cylinder
5. Tie-in to Harris LKG Offset Press

01:50 BREAK

NOTE: The students will now move back to the classroom for the lecture portion of the cylinder assembly on the Harris LKG Offset Press.

INTRODUCTION

02:00 During the last two hours of instruction the nomenclature and operation of the cylinder assembly of the ATF Chief 29 Offset Press was explained. During the next two hours the student will be taught the cylinder

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assembly of the Harris LXG Offset Press. It is very important that the student pay strict attention to the lecture and demonstration because the machines are different. After the demonstration each student will be called upon to operate and make adjustments on the cylinder assembly of both presses.

DEVELOPMENT

02:02 12. PACKING THE BLANKET AND PLATE CYLINDERS ON HARRIS LXG

- a. Cylinder undercuts
- b. Cylinder packing
 - (1) Pack blanket
 - (2) Pack plate
- c. Measuring the thickness of a blanket and plate

02:10 13. MOUNTING THE BLANKET AND PLATE

- a. Blanket
 - (1) Mike and select packing for blanket
 - (2) Mount blanket bars to blanket cylinder and tighten blanket on cylinder
- b. Plate
 - (1) Check plate size
 - (2) Mike and select packing
 - (3) Lock up ink rollers
 - (4) Parallel plate clamps
 - (5) Mount plate and tighten plate properly on cylinder

02:20 14. IMPRESSION CYLINDER

- a. Construction
 - (1) Has bearers
 - (2) Adjustment
- b. Electronic sheet detectors (Trips)
 - (1) Two automatic
 - (2) Two manual

02:30 15. REGISTER ADJUSTMENTS OF THE PLATE CYLINDER

- a. Twisting the plate
- b. Swinging the plate cylinder
- c. Changing image size

- (1) Image larger
- (2) Image smaller

(QUESTIONS AND COMMENTS PERIOD)

SUMMARY

- 02:45
- 1. Packing the Blanket and Plate Cylinders on the Harris LXG
 - 2. Mounting the Plate and Blanket
 - 3. Impression Cylinder
 - 4. Register Adjustments of the Plate Cylinder
 - 5. Tie-in to Demonstration

02:50 BREAK

NOTE: Students will now move to the pressroom for a demonstration on the Cylinder Assembly of the Harris LXG Offset Press

INTRODUCTION

03:00 During the last hour of instruction, the nomenclature and operation of the Harris LXG cylinder assembly was explained. During the next hour the student will see a demonstration of the operation, function and adjustment of the cylinder assembly. It is very important that you pay strict attention to this demonstration, because in the block of instruction which follows this demonstration, each of you will be called on to operate and make adjustments on the cylinder assembly.

During the demonstration look for the answers to the following questions.

- 1. How many cylinders in the cylinder assembly have bearers?
- 2. What is the undercut of the plate cylinder?
- 3. What cylinder moves when the press goes on impression?
- 4. How many degrees can the plate cylinder be swung?

DEVELOPMENT

- 03:02 16. PREPARING AND MOUNTING A BLANKET
 03:10 17. MOUNTING A PLATE
 03:20 18. TWISTING A PLATE

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03:30

19. SWINGING THE PLATE CYLINDER

03:40

20. CRITIQUE

- a. Repose key questions
- b. Clarify any misconceptions

(QUESTIONS AND COMMENTS PERIOD)

SUMMARY

03:45

- 1. Cleaning the Plate and Cylinders
- 2. Packing the Blanket and Plate Cylinders
- 3. Preparing and Mounting the Blanket and Plate
- 4. Impression Cylinder
- 5. Impression
- 6. Register Adjustments of the Plate Cylinder
- 7. Preparing and Mounting a Blanket
- 8. Mounting a Plate
- 9. Twisting the Plate
- 10. Swinging the Plate Cylinder
- 11. Packing the Blanket and Plate Cylinders on Harris LXC
- 12. Mounting the Blanket and Plate
- 13. Impression Cylinder
- 14. Register Adjustments of the Plate Cylinder
- 15. Preparing and Mounting a Blanket
- 16. Mounting a Plate
- 17. Twisting a Plate
- 18. Swinging the Plate Cylinder
- 19. Tie-in to Practical Exercise

03:50

BREAK

04:00 - 19:00

STUDENT PRACTICAL EXERCISE
(Refer to ANNEX C)

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SECTION III
SOURCE MATERIAL
THE CYLINDER ASSEMBLY

INTRODUCTION

In the previous lessons we discussed the operation of the controls, the feeder and the delivery systems of the offset press. In this lesson we will cover the function and operation of the cylinder assembly on the ATF Chief 29 DP and the Harris LXC Offset Presses.

The impression cylinder grippers grasp the pre-positioned sheet of paper at the front guides and carry it into contact with the blanket cylinder. Meanwhile, a plate mounted on the plate cylinder is inked and transfers its image to a rubber blanket mounted on the blanket cylinder. The blanket transfers or "offsets" the image to the sheet of paper on the impression cylinder. The impression cylinder then continues around and releases the sheet to the delivery system.

The cylinder assembly constitutes the "heart" of an offset press. A thorough understanding of image transfer from one cylinder to another and finally to the sheet of paper is a basic requisite for an offset pressman. The objective of today's lesson is to acquaint the student with these functions and develop an understanding of the cylinder assembly.

Each press operator will abide by all safety precautions when making adjustments or cleaning the cylinder assembly. The control switches will be set in the "safe" position and the cylinders will only be rotated by turning the flywheel manually.

DEVELOPMENT

1. CLEANING THE PLATE AND CYLINDERS

Show on cut-away
press model

Before a quality printing job can be produced, the plate and all cylinder surfaces, including bearers, must be clean.

a. Cleaning the plate.

- (1) Clean gum off the plate with water.
- (2) Remove dried ink. Use pumice powder and solvent.
- (3) Never use a sharp pointed instrument. This will damage the surface of the plate.

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(4) Do not allow water on the image side of the plate.
Water will dissolve the gum and cause oxidation on the plate.

b. Cleaning the cylinder surfaces and bearers.

(1) Remove gum with water, remove ink with solvent.
Most of the foreign matter that accumulates on the cylinders is gum arabic and ink. Water will dissolve the gum arabic, and cleaning solvent will remove the ink.

(2) Remove rust with crocus cloth and oil. A light film of oil will be kept on the cylinder surfaces and bearers at all times to prevent rust from recurring.

(3) Remove dirt on the cylinders. Dirt causes high spots which interfere with proper contact between the cylinders. Dirt also attracts rust which will cause permanent damage to the cylinder surfaces.

2. PACKING THE BLANKET AND PLATE CYLINDERS

Show sample of
packing paper

In order to obtain good printing there must be .003 of an inch pressure or "squeeze" between each of the cylinders. This pressure is achieved by packing the blanket and plate cylinders slightly above their bearer diameters. The packing of the blanket and the plate cylinders will be done only while the control switches of the press are in the "safe" position.

a. Cylinder undercuts. The plate and blanket cylinder have steel bands, commonly called bearers, encircling the outside edges of each cylinder and rising slightly above the cylinder surface. There is a shallow gap, or gutter, between the bearers and the edge of the usable cylinder surface. The blanket cylinder is undercut .071 inch below the surface of its bearers, and the plate cylinder is undercut .015 inch below the surface of its bearers.

Show on cut-away
press model

This is standard for all ATF Chief 29 Offset Presses.
(See figure 1)

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THE CYLINDER UNDERCUTS

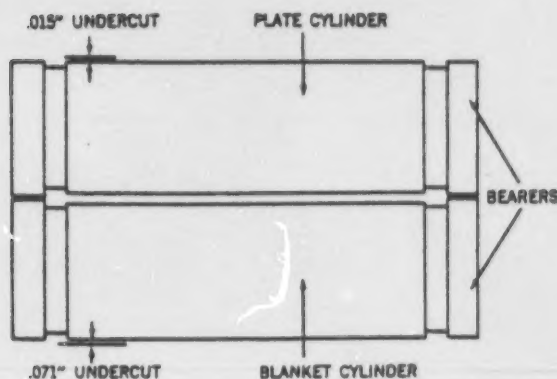


FIGURE 1

b. Cylinder packing.

(1) Pack blanket .002" above the bearers or .073".

The packing of the cylinders will be done only when the press is stopped and the switches are in the "safe" position. The blanket is underlayed with thin sheets of paper (packing) to raise it .002 inch above the blanket cylinder bearers. The plate is packed to .001 inch above the plate cylinder bearers. Since the bearers are in contact when the impression is on, this obtains the printing "squeeze" of .003 inch. Since the blanket cylinder has an undercut of .071 inch and is packed to .002 inch above its bearers, the blanket and packing together total .073 inch.

(2) Pack plate .001" above the bearers or .016".

The plate cylinder has an undercut of .015 inch and is packed to .001" above its bearers. The plate and packing together total .016 inch. (See figure 1)

(3) Tolerance of .0015. A tolerance of .0015 inch is permitted when measuring packing. This allows for the fact that blankets, plates, and packing do not always total the thickness desired. When faced with this problem, it is better to overpack with the tolerance.

c. Using the micrometer.

Show Model of
Micrometer

(1) Use to measure thickness of plate and blanket accurately. A micrometer is used to accurately

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measure the thickness of the blanket, plate and packing. A micrometer is a precision instrument which measures in thousandths of an inch. The micrometers used here are outside micrometers with frame widths of $\frac{3}{8}$ and $\frac{1}{2}$ inch.

(2) Accurate to .0001". Reading a micrometer is a simple task. The piece of material to be measured is placed between the measuring faces. The ratchet stop is turned clockwise until the ratchet starts clicking. The spindle will then be in good contact with the material, but yet not so tight that the material cannot slide between the measuring faces with a slight drag. The micrometer can then be read. Two scales are used to make the reading. The first is on the barrel, running horizontal to the user's view. The other scale encircles the thimble at right angles to the user's view. Each graduation on the barrel denotes .025 inch. Each graduation on the thimble denotes .001 inch. (See figure 2)

Show Model of
Barrel & Thimble

SECTIONAL VIEW OF THE MICROMETER CALIPER

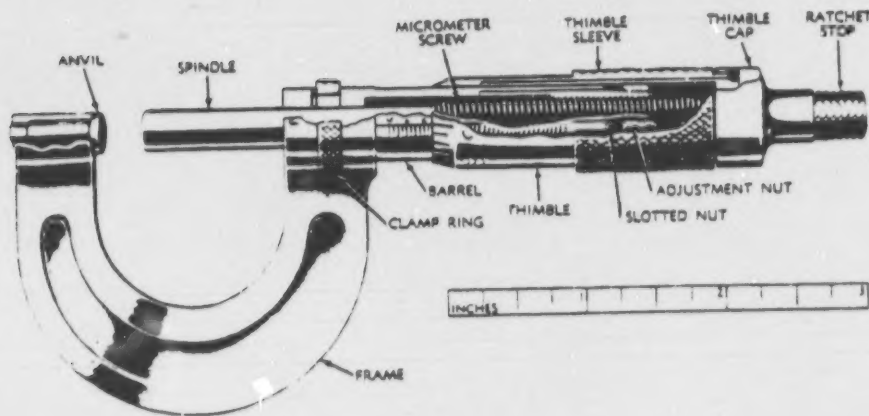


FIGURE 2

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4
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(3) Thimble. Each time a piece of material is measured, the thimble uncovers a portion of the graduations on the barrel. One of the graduations on the thimble is also aligned with the horizontal line on the barrel. Count the number of full graduations on the barrel. Do not count a partial graduation as this portion of the measurement is read from the scale on the thimble. Each full graduation on the barrel is equivalent to .001 inch. The number of thousandths of an inch read from the barrel is then added to the number of thousandths of an inch read from the thimble. This gives the thickness of the material being measured in thousandths of an inch.

(4) Barrel. For example, two full graduations on the barrel are visible, but only a portion of the third graduation shows. As only full graduations are counted and each graduation is equal to .025 inch, this would represent .050 inch. If the fifth graduation on the thimble is aligned with the horizontal line on the barrel and each graduation on the thimble is equal to .001 inch, this part of the reading represents .005 inch. Adding the two parts, the reading is .055 inch.

Demonstrate
Examples on
Model

d. Measuring the thickness of a blanket and plate. Blanket and plate thickness will vary; therefore, they must be measured with a micrometer before being mounted on the press. In order to assure accuracy and prevent errors due to low spots, the blanket and plate are "miked" in several places and an average taken. The micrometer should not be placed at the gripper or tail edges of the blanket or plate, as the clamps and bars will make the surfaces uneven and cause false readings. Also, the micrometer should not be pushed so far onto the material being measured that the material contacts the inside edge of the micrometer frame. This will bend the material and cause a false reading. (See figures 3 and 4)

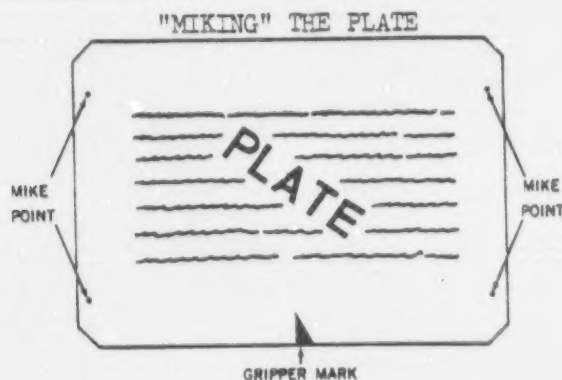


FIGURE 3

5
14282

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FIGURE 4

EXAMPLE - Blanket thickness is .065. Then you will need .008 packing to obtain the required thickness of .073.

3. PREPARING AND MOUNTING THE BLANKET AND PLATE Show Blanket

a. Putting bars on a new blanket. Several precautions must be taken when mounting blanket bars on a new blanket.

(1) New blanket. A new blanket must be thoroughly scrubbed with pumice powder and cleaning solvent to remove the slight glaze caused by oxidation of the rubber.

(2) Punch blanket. If the blanket has not been punched, place a blanket bar across one end of the blanket at right angles to the direction of the arrow on the cloth Demonstrate side of the blanket. The outer edge and the ends of the blanket bar must be even with the upper end and sides of the blanket. Insert a pencil into each hole in the blanket bar and make a circular mark on the rubber blanket. The pencil marks will then correspond exactly with the holes in the blanket bar. The same procedure is used on the other end of the blanket making certain that the second bar is parallel to the first. The blanket bars can then be removed and all of the indicated holes punched in or cut out. The holes must be cut cleanly, because irregular fragments of the rubber may cause the blanket bar bolts to bind. (See figure 5)

ATTACHING THE BLANKET BARS

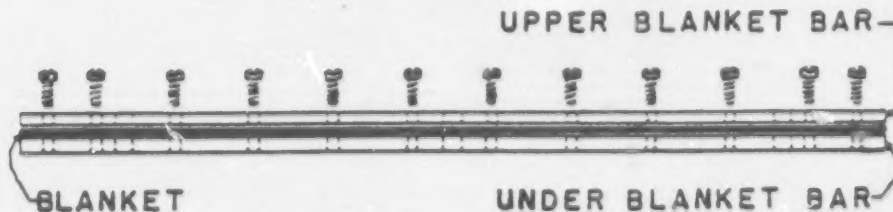


FIGURE 5

b. Mounting a blanket. Before working on the blanket or plate, remove the cylinder guard. This guard will never be removed until the operator has assured himself that the safe switches are turned to "safe", disconnecting all power from the press. As long as this guard remains off, the cylinders can be moved only by turning the flywheel manually. Power will never be used while mounting a blanket or plate.

(1) Mike and select packing for blanket. The blanket is first "miked". Several points, not near the blanket bars, will be checked and an average taken. (See figure 4.) Sufficient paper packing should be selected to total .073 inch.

(2) Mount blanket bars to blanket cylinder. Now place one blanket bar on the lower surface of the gap in the blanket cylinder. Three 9/16-inch bolts are passed through the holes in the blanket bar into the threaded holes in the cylinder gap, and the blanket bar tightened to the cylinder. Do not force these bolts. If they do not turn freely, it may be because they are binding on rubber. This will necessitate cutting the holes to a larger size. Care must be taken that the bolts are started properly into the threaded holes, or misthreading will result. Turn the cylinder slightly forward by hand, until it is possible to insert the packing sheets behind the blanket. Then turn the cylinder forward to the top of the cylinder gap and attach the free blanket bar to the reel rod with the three remaining 9/16-inch bolts. Take special care to prevent misthreading these bolts. It is best to start the center bolt first.

(3) Tighten blanket on cylinder. Place a one-inch wrench on the square end (operator's side) of the reel rod. A pawl and ratchet at the other end of the reel rod will hold the blanket tight. Hold the pawl into the ratchet and pull the wrench to tighten the blanket around the cylinder. Use only the pressure and leverage of the hands on the wrench when tightening the blanket. Never stand on the wrench, or use a wrench longer than the one furnished with the press. This can cause a serious injury to the operator or damage to the machine for which you will be held directly responsible. The tautness of the blanket can be determined by tapping the surface of the blanket between the reel rod and the tail edge of the blanket with the finger or some object that will not cut or otherwise injure the blanket surface. When removing the blanket, first release the tension from the reel rod. Then remove the three bolts locking the blanket bar to the reel rod and turn the cylinder backwards by hand until the blanket is off the cylinder and remove the three bolts locking the other blanket bar and the blanket from the cylinder. Dispose of the paper packing if it has become wrinkled or sticky.

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c. Mounting a plate.

(1) Mike plate. The plate must be "miked" before mounting. Several points, not near the clamp edges, are checked and an average taken. Sufficient paper packing is selected to total .016 inch including the plate.

(2) Insert plate into clamps. Loosen all plate clamps and back off the tension screws. This will permit a maximum amount of adjustment when subsequently tightening the plate around the cylinder. Loosen the 4 locking screws (5/16-inch Allen) on the flywheel side of the cylinder. Position the pointer in the center of the indicator plate by using the Pinion wrench. Insert the gripper edge of the plate as far as possible into the top plate clamp. If the plate is not inserted into the clamp the full distance, it is apt to go around the cylinder crooked and pull out of the clamp when it is being tightened. The plate is centered in the clamp by aligning the left (flywheel side) edge of the plate with the left edge of the cylinder surface. When the plate has been centered, the top clamp can be tightened. Check the top clamp to make certain that it is flush with the gap or the plate will not tighten evenly around the cylinder. In order to position the plate around the cylinder properly, the impression must be on. To do this, lock the ink motion throw-off handle in its up position. This prevents the ink rollers from dropping onto the plate cylinder when the impression is on. Then place a small strip of paper under the automatic trip to prevent the press from coming off impression while the plate is being mounted. Now press the impression "on" lever down. This lever is located directly above the feeder valve. This action causes the impression to be on as the press is turned forward, i. e., the blanket cylinder trip lever will straighten out and cause the blanket cylinder to move into contact with the plate and impression cylinders. Since we want the press on impression when the plate starts between the cylinders, we push down on the blanket cylinder trip lever, causing it to straighten out, before we turn the flywheel. Next turn the press forward, by hand, until the plate moves between the plate and blanket cylinders. Place the correct packing behind the plate and turn the press forward by hand until the plate covers the plate cylinder. Insert the trailing edge of the plate into the bottom plate clamp and tighten the clamp. Take the slack out of the plate by tightening the tension screws. These screws must not be overtightened or the plate will be stretched, torn or pulled out of the plate clamps. When a crease begins to appear in the plate at the point where it passes over the cylinder gap,

tap the plate gently with a wrench. If the plate is tightened sufficiently, a solid sound will result. Push the manual trips, remove the strip of paper from under the automatic trip, and turn the press forward one revolution to take the impression off, recheck tension screws. Any excess packing extending past the plate must be removed.

(3) Remove plate. When removing the plate, loosen all tension screws, free the tail edge from the bottom clamp and turn the press backwards by hand until the plate is off the cylinder. Loosen the gripper clamps and remove the plate from the press. Replace the cylinder guard, after work on the blanket and plate has been completed.

Show on cut-
away model press

4. IMPRESSION CYLINDER

The impression cylinder grasps the positioned sheets at the front guides, carrying them into contact with the blanket cylinder, and releasing the printed sheets to the delivery system.

a. Construction.

(1) Has no bearers. There are no bearers on the impression cylinder. This permits moving the cylinder into proper printing contact with the blanket, when the blanket is packed below the height of the blanket cylinder bearers.

(2) Cylinder grippers. The cylinder grasps the sheets with twelve gripper fingers mounted on a shaft in the cylinder gap. These gripper fingers are operated by a pin and tumbler system. The tumbler, mounted on the operator's end of the gripper shaft, strikes one pin to close the gripper's fingers at the front guides and strikes another pin to open the fingers when the delivery gripper fingers close on the sheet.

Show on cut-
away model press

b. Adjustment.

To permit the correct .003 inch printing pressure when printing on various thicknesses of paper stock and to allow for various heights of blanket and packing, the impression cylinder is provided with an eccentric movement. This movement is controlled by the impression cylinder adjustment handle, located on the operator's side of the press behind the automatic pile receder.

5. IMPRESSION

The three cylinders will not contact each other unless the press is "on impression". When the press is running and the impression throw-on lever is depressed, the blanket trip lever will straighten out and cause the blanket cylinder to move eccentrically until its bearers contact the plate cylinder bearers and (assuming the impression cylinder adjustment handle is not backed off) the blanket surface contacts the surface of the impression cylinder. It is in this position only that the image from an inked plate will transfer to the blanket, and in turn, to the paper.

a. Impression trips. Any offset press is equipped with trips which, when activated, cause the blanket cylinder to move away from the plate and impression cylinders (to trip off impression).

Show on cut-away model press

(1) Manual trips. The ATF Chief 29 presses are equipped with two manual trips, one located on the operator's side near the impression cylinder bearing and the other located at the front end of the press on the flywheel side. These need only be pushed or depressed to activate the mechanism.

(2) Automatic trips. The ATF Chief 29 presses are equipped with an automatic trip located at the center of the conveyor board near the side guide bar. Should a sheet fail to reach the front guides while the press is printing, the finger on the automatic trip not supported by a sheet of paper stock, will drop engaging the trip activating mechanism beneath the conveyor board.

b. Counter. The counter is an automatic device for keeping count of the quantity of stock being run. There is no way that the counter can record the number of printed sheets that actually reach delivery pile. The counter will record only the number of revolutions the press makes while it is on impression.

Show on cut-away model press

6. REGISTER ADJUSTMENTS OF THE PLATE CYLINDER

When the first sheets are printed during make ready, the image usually is not properly positioned in relation to the gripper edge of the sheet. Two adjustments of the plate or plate cylinder normally will correct this problem. These adjustments will only be made with the cylinder guard removed and the switches in the "safe" position.

a. Twisting the plate.

(1) Always twist before swinging cylinder. If the image is crooked in relation to the gripper edge of the sheet, twist the plate to a new position on the plate cylinder. Always twist the plate before swinging.

(2) How to twist. To do this, loosen or tighten the proper tension screws so as to allow the plate to shift on the plate cylinder. The usual procedure is to make the shift so that one corner of the gripper edge of the plate is pulled down. This will cause the image to print closer to the gripper edge of the sheet at the same relative corner, resulting in less margin. The amount of twist can be determined closely by placing one mark on the cylinder at the side of the plate, another mark on the plate itself, and observing the variation in the distance between the marks as the plate is twisted. The maximum amount that the plate can be twisted is approximately 1/8 inch. Further twisting will tear the plate or pull it out of the plate clamps. When the plate has been twisted to the desired position, any slack remaining in the plate can be removed by tightening the necessary tension screws. Finally, the old image must be washed from the blanket.

b. Swinging the plate cylinder. If the image is parallel with, but too close or too far from the gripper edge of the sheet, the plate cylinder may be swung to a different position in relation to the blanket cylinder. Swinging the cylinder up will cause the image to print farther from the gripper edge of the sheet, thus providing more margin. Swinging the cylinder down will cause the image to print closer to the gripper edge of the sheet, or less margin. The amount of swing can be determined closely by aligning a mark on the plate cylinder bearer with a plate cylinder gear tooth and observing the variation between the two points as the cylinder is swung. The maximum amount of plate cylinder swing is 1 and 1/2 inches (3/4 inch either way from the center point). Always center the plate cylinder before printing a new job! Free the cylinder from its gear-segment—loosen the four locking screws (5/16 inch Allen) on the flywheel side of the cylinder. Loosen the one adjacent to the plate shifting gear segment last so the cylinder will not slip. Then insert the plate shifting gear segment last so the cylinder will not slip. Then insert the plate cylinder pinion wrench and engage with the gear segment. The plate cylinder can then be swung to the desired position. Finally, tighten the four locking screws and wash the old image from the blanket. The cylinder guard will now be replaced.

c. Changing the image size.

(1) Image larger. In order to lengthen the printed image, it is necessary to take packing from under the plate and put it, or a like amount, under the blanket. This changes cylinder diameters, making the plate circumference smaller and the blanket circumference larger. (Note that the overall transfer pressure or "squeeze" has not changed)

(2) Image smaller. The image size can be decreased by removing packing from under the blanket and placing it, or a like amount, under the plate. Again, all changes in image size will be around the cylinder.

7. PREPARING AND MOUNTING A BLANKETa. Mounting a new blanket.

- (1) Clean blanket properly.
- (2) Punch holes (if necessary).
- (3) Attach blanket bars.
- (4) Mike and select packing.
- (5) Mount blanket on press properly.
- (6) Place press on impression for 50 revolutions. Stop press and retighten, this will remove the initial stretch from a new blanket.

(7) Pull a copy from press. Blanket may be under-packed now because initial stretch has been removed. Add packing .001 inch at a time until proper printing pressure is obtained.

b. Mounting a used blanket.

- (1) Attach blanket bars.
- (2) Mike and select packing.
- (3) Mount blanket bars to blanket cylinder.
- (4) Tighten blanket on cylinder.
- (5) On old blankets (used blankets) initial stretch has been removed.

3. MOUNTING A PLATE

- a. Select proper plate.
- b. Check for scratches, dents and image detail.
- c. Make sure plate is clean before mounting.
- d. Wipe plate and select packing.
- e. Clean cylinder surface and bearers.
- f. Parallel plate clamps. (Clamps must be flush and centered against cylinder)
- g. Open quoin keys to receive plate.
- h. Center plate on cylinder.
- i. Insert GRIPPER edge of plate into GRIPPER clamp and tighten quoin keys on the gripper clamp.
- j. Put press on impression.
 - (1) Lock ink rollers up.
 - (2) Block automatic trip with strip of paper.
 - (3) Raise feeder valve and depress the impression throw-on lever.
 - (4) Push down on the impression linkage arm, so that the impression linkage arm is straight before turning the flywheel.
- k. Insert packing and turn flywheel, hold plate snug and force all slack to the tail edge as plate rolls around cylinder.
- l. Insert tail edge of plate into tail clamp and tighten quoin keys.
- m. Tighten tension screws on tail clamp and check plate tightness to cylinder surface on tail edge.
- n. Take press off of impression.
 - (1) Use manual trip to lower feeder valve.
 - (2) Unblock automatic trip.

(3) Using the flywheel, turn cylinder one complete revolution to separate cylinders.

c. Tighten gripper clamp tension screws and check plate tension on gripper end of the plate cylinder surface.

9. TWISTING THE PLATE

a. When the first few sheets are printed during make-ready, it will often be found that the image is not positioned properly in relation to the gripper edge of the sheets of paper that are being run through the press. The first adjustment is to parallel the image to the gripper edge of the paper by twisting the plate.

b. The following is the correct procedure when twisting the plate on the ATF Chief 29 Offset Press:

(1) Turn all safety switches on safe and remove the cylinder guard.

(2) Make a light line on the plate and another one on the plate cylinder surface, ahead of the distance you want to twist the plate and in the direction of the cylinder gap.

(3) Mark a light line on the opposite side of the plate extending it to the cylinder surface. (If the opposite side of the plate moves it can be detected.)

(4) Loosen the three tension screws and the four quoin keys located on the plate tail clamp bar.

(5) Tighten the tension screw in the corner of the gripper plate clamp on the side of the plate that is being twisted. Also tighten the center tension screw to a lesser degree. When the line on the plate slides forward and is aligned with the mark on the cylinder, the plate slides forward and is aligned with the mark on the cylinder, the plate has been twisted properly. The maximum amount that the plate can be twisted is approximately 1/8 inch. Further twisting will tear the plate and pull it out of the clamps.

(6) Remove the tail edge of the plate from the plate clamp and rotate the press backward manually one revolution.

(7) Run the press on impression.

(a) Lock up the inking system.

(b) Block the automatic trip finger with a strip of paper.

(c) Lift the feeder valve and push down on the impression lever.

(d) Push down on the impression linkage until it straightens out.

(8) Rotate the press forward one revolution.

(9) Put the trail edge of the plate back in the bottom plate clamp, close the quoin keys and take up all the slack in the plate by tightening the tension screws.

c. Make sure that the old image is removed from the blanket and the cylinder guard is replaced before jogging or running the press.

10. SWINGING THE PLATE CYLINDER

After the image is paralleled by twisting the plate, the image maybe too close or too far from the gripper edge of the sheet. To make the necessary corrections, the plate cylinder may be swung to a different position in relation to the blanket cylinder. Swinging the cylinder up will cause the image to print farther from the gripper edge of the sheet, providing more margin. Swinging the cylinder down will cause the image to print closer to the gripper edge of the sheet providing less margin. To swing the cylinder, proceed as follows.

a. Turn all safety switches on safe and remove the cylinder guard.

b. Unlock the four 5/16-inch Allen locking screws, located on the flywheel side of the plate cylinder. Loosen the locking screw in the cylinder gap last.

c. Mark two lines on the plate cylinder bearer, with one of the lines aligned on a gear tooth of the plate cylinder gear. (The distance between the two lines is the amount you wish to swing the cylinder)

d. Engage the pinion wrench in the gear segment on the flywheel side of the plate cylinder and move the handle of the pinion wrench up or down to move the cylinder.

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e. Move the pinion wrench handle up or down and observe the movement of the lines that were marked on the cylinder bearer. When the line on the plate cylinder gear moves the distance between the lines on the plate cylinder bearer, stop swinging the cylinder.

f. Relock the four 5/16-inch Allen screws.

g. Wash the blanket and replace the cylinder guard before turning the safety switch off.

11. CRITIQUE

a. Repose key questions.

Q: What do we use to clean gum off of the cylinders ?

A: Water

Q: What is the undercut of the Plate Cylinder?

A: .015

Q: Does the impression cylinder have bearers?

A: No

b. Clarify any misconceptions.

12. PACKING THE BLANKET AND PLATE CYLINDERS ON HARRIS LXG

In order to obtain good printing there must be .003 of an inch pressure or "squeeze" between each of the cylinders. This pressure is achieved by packing the blanket cylinders slightly above the bearer diameters. The packing of the blanket and the plate cylinders will be done only while the control switches of the press are in the "safe" position.

a. Cylinder undercuts. The plate and blanket cylinders have steel bands, commonly called bearers, encircling the outside edges of each cylinder, and rising slightly above the cylinder surface. There is a shallow gap, or gutter, between the bearers and the edge of the usable cylinder surface. The blanket cylinder is undercut .075 inch below the surface of its bearers, and the plate cylinder is undercut .015 inch below the surface of its bearers. (See figure 6.)

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CYLINDER UNDERCUTS

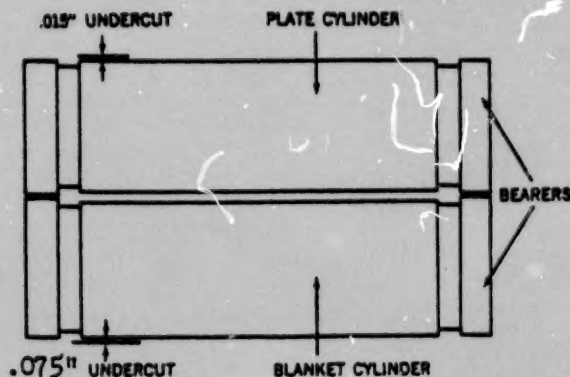


FIGURE 6

b. Cylinder packing.

(1) Pack blanket. The packing of the cylinders will be done only when the press is stopped and the switches are in the "safe" position. The blanket is underlaid with thin sheets of paper (packing to raise it .003" above the cylinder bearers from .075" to .078"). (See figure 6.)

(2) Pack plate. The plate cylinder has an undercut of .015" and is packed to bearer height. The plate and packing together total .015". (See figure 1)

c. Measuring the thickness of a blanket and plate.

Blanket and plate thickness will vary; therefore, they must be measured with a micrometer before being mounted on the press. In order to assure accuracy and prevent errors due to low spots, the blanket and plate are "miked" in several places and an average taken. The micrometer should not be placed at the gripper or tail edges of the blanket or plate, as the clamps and bars will make the surfaces uneven and cause false readings. The micrometer should not be pushed so far on the material being measured, that contact is made with the inside edge of the micrometer frame. This will bend the material and cause a false reading (see figures 2 and 3).

13. MOUNTING THE BLANKET AND PLATE

a. Blanket. Before working on the blanket or plate, remove the cylinder guard. This guard will never be removed until the operator has assured himself that the safe switches are turned to "safe", thus disconnecting all power from the press. As long as this guard remains off, the cylinders can be moved only by turning the flywheel manually. Power will never be used while mounting a blanket or plate.

(1) Mike and select packing for blanket. The blanket is first "miked". Several points, not near the blanket bars, will be checked and an average taken (see figure 4). Sufficient paper packing should be selected to total .078 inch.

(2) Mount blanket bars to blanket cylinder and tighten blanket on cylinder. Now place the front edge blanket bar (fig 7, no. 1) in the slot in the cylinder (fig 7, no. 2). Select packing and cut it to the correct size. Insert the front edge of the packing (fig 7, no. 3) between the cylinder and the blanket (fig 7, no. 4). Push the packing forward and over the edge of the cylinder. Hold the free end of the blanket and turn the cylinder by hand until the reel rod is accessible. Be sure that the packing is not displaced or wrinkled. Locate the blanket bar in the reel rod and tighten screws to secure the bar. Tighten the blanket by turning the reel rod. The ratchet on the end of the reel rod will hold the blanket in place.

INSTALLATION OF BLANKET

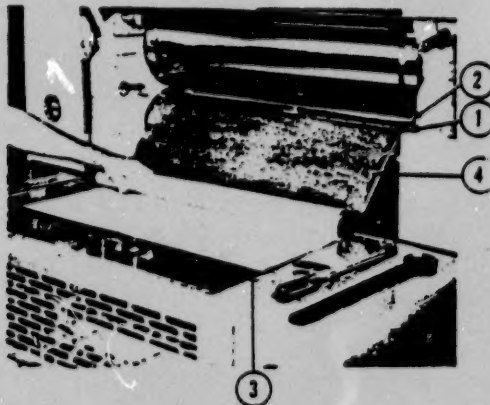


FIGURE 25

b. Plate.

(1) Check plate size. Measure the plate to be sure it is the proper size. All plates used on the Harris LKG should measure 27x30 inches from tail to gripper edge.

(2) Mike and select packing. New plates will be normally .012" thick which makes it necessary to add .003" in packing sheets to make the plate bearer height. Each plate should be micrometered before installation to determine the amount of packing necessary.

(3) Lock up ink rollers. By pulling out the handle of the Form Roller Manual Control you lock up the ink rollers. This prevents the ink rollers from coming in contact with the plate when the press is put on impression.

(4) Parallel plate clamps. Center the plate clamp on the plate cylinder so that the center of the plate and plate clamp will be in the exact center of the plate cylinder.

(5) Mount plate and tighten plate properly on cylinder. Insert the front edge of the plate in the clamps. Lock up clamps. Place packing behind plate, push the feeder latch handle in the second notch and turn the cylinder forward. Pressure will be applied to hold and roll the plate evenly around the cylinder. Continue to turn the cylinder until the rear plate clamp can be tightened. The plate must be tight around the cylinder, but not tight enough to distort it. Check the plate carefully to be certain it is firmly in contact with the cylinder at all four corners.

14. IMPRESSION CYLINDER

a. Construction.

(1) Has bearers. Bearers on this cylinder are .015" below the cylinder body. The undercut bearers provide the adjustment necessary to change the packing between the plate and blanket cylinder to alter the length of the print.

(2) Adjustment. The blanket cylinder is adjusted to the impression cylinder for the thickness of stock being run. Normally, .003" squeeze is required between the blanket and impression cylinders to transfer the ink from the blanket to the paper. To arrive at the correct printing pressure between the blanket and impression cylinders, move the blanket cylinder away until a light or broken print is shown. Then gradually move it toward the impression cylinder until the ink is transferred properly

to the sheet. This is done by loosening the cap screw (above the blanket cylinder) on the operator's side and corresponding cap screw on the gear side of the press and moving the handle (on the operator's side) to increase or decrease pressure on the impression cylinder. Whenever a change is made in the packing under the blanket, the pressure on the impression cylinder is changed an equivalent amount.

b. Electronic sheet detectors (Trips).

(1) Two automatic. Sheet detectors function to release printing pressure between the plate, blanket and impression cylinders. The detectors will operate automatically if the sheet is not straight when it reaches the sheet detectors - if more than one sheet at a time reaches the sheet detectors too fast or if it is delayed.

(2) Two manual. One is a red "TRIP" button located at the delivery end of the press. The other is the feeder latch handle (located on the operator's side). When the feeder latch handle is disengaged from the impression position it automatically will trip the press.

15. REGISTER ADJUSTMENTS OF THE PLATE CYLINDER

When the first sheets are printed during make-ready, often the image is not positioned properly in relation to the gripper edge of the sheet. Two adjustments of the plate or plate cylinder usually will correct this. These adjustments will be made only with the cylinder guard removed and the switches in the "safe" position.

a. Twisting the plate.

(1) If the image is crooked in relation to the gripper edge of the sheet, twist the plate to a new position on the plate cylinder.

(2) To do this, loosen or tighten the proper tension screws so as to allow the plate to shift on the plate cylinder. The usual procedure is to make the shift so that one corner of the gripper edge of the plate is pulled down. This will cause the image to print closer to the gripper edge of the sheet at the same relative corner, resulting in less margin. The amount of twist can be closely determined by placing one mark on the cylinder at the side of the plate and another mark on the plate itself, and observing the variation in the distance between the marks as the plate is twisted.

(3) The maximum amount that the plate can be twisted is approximately 1/8 inch. Further twisting will tear the plate or pull it out of the plate clamps.

(4) When the plate has been twisted to the desired position, any slack remaining in the plate can be removed by tightening the necessary tension screws.

(5) Finally, the old image must be washed from the blanket.

b. Swinging the plate cylinder. If the image is parallel with, but too close or too far from the gripper edge of the sheet, the plate cylinder may be swung to a different position in relation to the blanket cylinder swinging the cylinder up will cause the image to print farther from the gripper edge of the sheet, providing more margin. Swinging the cylinder down will cause the image to print closer to the gripper edge of the sheet, or less margin. The plate cylinder swing adjustments are located on the plate cylinder, on the flywheel side of the press. The plate cylinder can be rotated 360° to locate work on the sheet after the cap screws (fig 8, no. 1) have been loosened. Use planetary gear (fig 8, no. 2) to rotate the cylinder to make this adjustment.

PLATE CYLINDER ADJUSTMENT



FIGURE 8

c. Changing the image size.

(1) Image larger. In order to lengthen the printed image it is necessary to take packing from under the plate and put it, or a like amount, under the blanket. This changes the cylinder diameters, making the plate circumference smaller and the blanket circumference larger. (Note that the overall transfer pressure or "squeeze" has not changed.)

(2) Image smaller. The image size can be decreased by removing packing from under the blanket and placing it, or a like amount, under the plate. Again, all changes in image size will be around the cylinder. (Note - whenever a change is made in the packing under the blanket, the pressure on the impression cylinder must be changed an equivalent amount.)

16. PREPARING AND MOUNTING A BLANKET

- a. Clean blanket properly.
- b. Punch holes (if necessary).
- c. Attach blanket bars.
- d. Mike and select packing.
- e. Mount blanket on press.
- f. Place press on impression for 50 revolutions. Stop press and tighten again, this will remove the initial stretch from a new blanket.
- g. Pull a copy from the press. Blanket may be under-packed now because initial stretch has been removed. Add packing, .001 inch at a time, until proper printing pressure is obtained.

17. MOUNTING A PLATE

- a. Select proper plate.
- b. Check for scratches, dents and image detail.
- c. Make sure plate is clean before mounting.
- d. Mike plate and select packing.
- e. Clean cylinder surface and bearers.

- f. Parallel plate clamps. (Clamps must be flush and center against cylinder)
- g. Open clamps to receive plate.
- h. Center plate cylinder.
- i. Insert GRIPPER edge of plate into GRIPPER clamps and tighten on the gripper clamps.
- j. Put press on impression by pushing feeder latch handle all the way forward into number two positions.
- k. Lock ink rollers up.
- l. Insert packing and turn flywheel, hold plate snug and force all slack to the tail edge as plate rolls around cylinder.
- m. Insert tail edge of plate into tail clamps and tighten clamps with pin wrench.
- n. Tighten tension screws on tail clamp and check plate tightness to cylinder surface on tail edge.
- o. Turn press (by hand) until it comes off impression.
- p. Tighten gripper clamp tension screws and check plate tension on gripper end of plate cylinder surface.

18. TWISTING A PLATE

When the first few sheets are printed during makeready, often the image is not properly positioned in relation to the gripper edge of the sheets of paper that are being run through the press. The first adjustment is to parallel the image to the gripper edge of the paper by twisting the plate.

- a. Turn all safety switches on "safe" and remove cylinder guard.
- b. Position plate cylinder so that the gripper edge can be marked.
- c. Mark a light line on the plate and another on the plate cylinder surface.
- d. Mark another light line ahead of the distance you want to twist the plate and in the direction of the cylinder gap.

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e. Mark a light line on the opposite side of the plate extending it to the cylinder surface. (If the opposite side of the plate moves it can be detected.)

f. Loosen the tension screws and open the bottom clamp.

g. Tighten the tension screw in the corner of the plate cylinder that is to be twisted. (When the line on the plate slides forward and is aligned with the mark on the cylinder, the plate has been properly twisted.) The maximum amount that the plate can be twisted is approximately 1/8 inch.

h. Remove the tail edge of the plate from the plate clamp and rotate the press backward manually one revolution.

i. Re-square the bottom clamp with the face of the cylinder.

j. Put on impression.

k. Lock up the inking system.

l. Roll plate back around cylinder.

m. Put back edge of plate into bottom clamps.

n. Tighten plate clamps and tension screws.

o. Trip press off impression.

p. Roll cylinder one complete turn.

q. Check top clamp and all marks to make sure the plate has been twisted correctly.

r. Make sure that the old image is removed from the blanket and the cylinder guard is replaced before jogging or running the press.

19. SWINGING THE PLATE CYLINDER

After the image is paralleled by twisting the plate, the image may be too close or too far from the gripper edge of the sheet. The plate cylinder can be swung to a different position in relation to the blanket cylinder. Swinging the cylinder up will cause the image to print farther from the gripper edge of the sheet, providing more margin. Swinging the cylinder down will cause the image to print closer to the gripper edge of the sheet with less margin. To swing the cylinder, proceed as follows.

- a. Turn all safety switches on safe and remove the cylinder guard.
- b. Determine how far to move.
- c. Mark this on a small piece of paper.
- d. Open guard on gear side so that the planetary gear is accessible and the calibrated scale is facing toward the delivery.
- e. Position paper on calibrated scale so it can be moved the desired amount (to or away from the gripper edge).
- f. Loosen the three cap screws.
- g. Move the desired amount.
- h. Tighten the three cap screws. NOTE - DO NOT TIGHTEN CAP SCREWS WITH EXCESSIVE PRESSURE. THE HEADS WILL BREAK OFF.
- i. Close guard.
- j. Make sure old image is removed from the blanket and the cylinder guard is replaced before jogging or running the press.

20. CRITIQUE

- a. Repose key questions.
 - Q: How many cylinders in the cylinder assembly have bearers?
 - A: All three. Plate, blanket and impression cylinder.
 - Q: What is the undercut of the plate cylinder?
 - A: .015"
 - Q: What cylinder moves when the press goes on impression?
 - A: Blanket cylinder.
 - Q: How many degrees can the plate cylinder be swung?
 - A: 360°
- b. Clarify any misconceptions.

SUMMARY

The cylinder assembly transfers the inked image from the plate to the blanket and then to the paper. The plate and the cylinder surfaces are cleaned of all foreign materials before mounting the blanket and plate. Dried gum arabic is removed with water; ink, grease and other dirt are removed with cleaning solvent. Rust may be removed with oil and crocus cloth. Pumice powder can be used as an abrasive, if necessary, in the cleaning process. Always wash hands after using cleaning solvent to avoid irritation.

The micrometer is used to measure accurately the blanket, plate and packing. To read the micrometer, the number of full graduations on the barrel are counted, multiplied by .025 inch and added to the number of thousandths of an inch shown on the thimble. The blanket is mounted before the plate. The impression will be on when mounting a plate and care will be taken, when increasing the tension, that the plate is not stretched, torn or pulled out of the plate clamps.

A printing pressure of .003 inch is required between each of the cylinders. This is achieved by packing the blanket and plate with paper and by moving the impression cylinder so the stock contacts the blanket with .003 inch pressure. The plate cylinder is undercut .015 inch on both the ATF Chief 29 and the Harris LXG.

The plate cylinder on the ATF Chief 29 is packed .001" above the bearers to a thickness of .016", while the Harris LXG is packed to bearer heights of .015".

The blanket cylinder on the ATF Chief 29 is packed from .071" to .073" thereby producing an overpacking of .002". The Harris LXG goes from .075" to .078 to achieve a .003 printing pressure. Both machines achieve the .003 printing pressure but do it by different means.

Twisting is very similar on both machines. Swinging is a little different but only in the amount that the cylinder moves. On the ATF Chief 29 we can only move 1 and 1/2" or 3/4" each way, while the Harris LXG will move around completely or 360°.

Whenever any part of the cylinder assembly is being worked on or adjusted, the press will be stopped and the safe switches will be turned to the "safe" position. The student will remain constantly alert and follow all safety precautions.

STUDENT PRACTICAL EXERCISE

SUBJECT: Offset Press Operation
LESSON: Cylinder Assembly
OBJECTIVE(S): To insure the student a qualified level of knowledge concerning procedure for the operation of the cylinder assembly.

NOTE TO INSTRUCTOR:

1. Insure that all materials are on hand and the equipment is in operating condition.
2. Divide class into groups of two students per press.
3. Stress the following.
 - a. Accuracy
 - b. Safety
4. Ask questions to insure that students understand the procedure.
5. Make certain that each student knows which press he is to work on during the practical exercise.
6. Issue students the material and tools necessary to perform the practical exercise.

MATERIALS AND SUPPLIES REQUIRED:

- | | |
|--|---------------|
| 1. Packing paper sheets | 20 per group |
| 2. Blanket - $27\frac{1}{4}$ " x $29\frac{1}{2}$ " | one per group |
| 3. Plate - $27\frac{1}{4}$ " x $29\frac{1}{2}$ " | two per group |

EQUIPMENT:

- | | |
|---|---------------|
| 1. Press, offset lithographic
ATF- Model "Chief 29" or
Harris LXG | one per group |
| 2. Jog table | one per group |
| 3. Cabinet | one per group |
| 4. Tools, set | one per group |
| <ol style="list-style-type: none">a. Tool boxb. Pin wrenchc. Ratchet wrenchd. Blanket cylinder wrench (one inch) | |

ANNEX C
T.440-106 (10-69)

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PROGRAMMED LESSON

OFFSET PRESS OPERATION
COURSE

CYLINDER ASSEMBLY (ATF-DP)



JANUARY 1973

DEFENSE MAPPING SCHOOL — FORT BELVOIR, VIRGINIA

STOCK NUMBER: T.O.13-8J-PT-006

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CYLINDER ASSEMBLY (ATF-DP)**Programmed Lesson**

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INTRODUCTION

The cylinder assembly is the heart of the offset printing press. It is in this assembly that the paper receives the image to be reproduced.

Adjustments required for the assembly are critical and essential for quality reproduction. In this program you will learn the functions of the various cylinders in the assembly and how to make the adjustments necessary for the proper operation of the cylinder assembly.

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CYLINDER ASSEMBLY (ATF-DP)

INSTRUCTIONS TO STUDENTS

This is a programmed lesson. It divides the lesson into small frames, most of which contain missing words. You are to read and study the frame and fill in the missing words when appropriate. The answer to the frame is on the following page. If your answer does not agree with the answer provided, re-study the frame or frames, or ask for assistance.

There are illustrations provided to better help you understand the material. Study them also. This booklet belongs to you. Make notes in it if you desire.

Take your time and pace yourself. Begin with frame #1 at the top of page 1 and continue along level A --- the top third of the page --- until directed to level B --- the middle of the page --- until directed to level C. At the end of level C is a self-test. When you complete the program, take the self-test to review what has been taught.

CYLINDER ASSEMBLY (ATF-DP)
OBJECTIVES OF THIS LESSON

Upon successful completion of this program, you will be able to perform the following tasks pertaining to the cylinder assembly of the ATF-DP offset printing press.

1. Name and describe the function of the three cylinders in the assembly.
2. Properly clean the cylinder surfaces and bearers.
3. Describe cylinder undercuts.
4. Identify the amount of undercut of the plate cylinder.
5. Identify the amount of undercut of the blanket cylinder.
6. Recite cylinder packing requirements.
7. Name the amount of packing of the plate cylinder.
8. Identify amount of packing of the blanket cylinder.
9. Demonstrate the use of the micrometer.
10. Demonstrate how to mike a plate.
11. Demonstrate how to mike a blanket.
12. Demonstrate how to mount a plate.
13. Demonstrate how to mount a blanket.
14. Describe the construction and adjustment of the impression cylinder.
15. Recite the eccentric movement of the blanket cylinder.
16. Demonstrate how to twist a plate.
17. Demonstrate how to swing a plate.
18. Describe the methods for changing the image size.

293

LEVEL A

1. The offset printing press has three main cylinders that operate in an assembly which is the heart of the printing process. Since there are three cylinders and they are assembled together, we refer to this unit as the _____.

LEVEL B

31. Each graduation on the barrel denotes .025 inch and each graduation on the thimble denotes .001 inch. The reading is obtained by reading the number of full graduations of .025 from the horizontal scale located on the _____ and the amount of individual .001 inch units from the vertical scale located on the _____. The sum of the two readings is the correct thickness of the item being measured.

LEVEL C

61. If a new blanket is to be prepared for mounting, _____ bars must be attached and they must be at _____ to the direction of the arrow on the _____ side of the blanket. Holes must be punched in the blanket to correspond with the holes in the blanket bars.

399

294

1. cylinder assembly

31. barrel, thimble

61. blanket, right angles, back

295

2. The three cylinders are the plate cylinder, blanket cylinder and impression cylinder. Each cylinder plays a specific part in the printing cycle and together they make up the assembly we call the _____.

32. Each graduation on the barrel represents _____ inch and each graduation on the thimble represents _____ inch. The _____ of the two readings gives the correct thickness of the item being measured to the nearest _____ inch.

62. After the blanket has been punched with holes corresponding with those in the blanket bars, the blanket is placed between the _____ and _____ blanket bars, attached together with the screws and mounted on the _____ cylinder.

296

2. cylinder assembly

32. .025, .001, sum, .001

62. upper, under, blanket

312⁴

3. Since the printing plate carries the image we wish to reproduce, the plate is mounted on one of the cylinders of the cylinder assembly (TOP CYLINDER). Therefore this cylinder is called the _____.

33. Plate and blanket thickness will vary. Therefore, it is necessary to ~~measure~~ them with a micrometer before mounting them on the press. Plates and blankets should be measured on all four corners approximately three inches away from the edges. The reason for ~~measuring~~ them in _____ places is to establish an average thickness.

(SEE FIGURE 3 & 4)

63. Before punching a new blanket and affixing the blanket bars, it should be scrubbed thoroughly with pumice powder and solvent. This removes the glaze caused by oxidation of the rubber. One should never clean a new blanket with any thing other than _____ and _____.

298

3. plate cylinder

33. four

63. pumice powder, solvent

4. Since the image on the plate constantly receives a supply of ink from the ink rollers as the plate cylinder revolves, the next step is to transfer this inked image from the _____ to another cylinder.

34. The reason for using the average of the four measurements is because it gives the best overall thickness. The figure used for plate and blanket thickness when computing for the amount of packing required is the figure obtained after taking an _____ of the four readings obtained.

64. If a new blanket is used, the pressman must be alert for the new blanket to stretch. After several hundred impressions have been made, the pressman should re-tighten the blanket around the cylinder in order to remove the _____ which occurs with initial use of a new blanket. If this isn't done, the image reproduced will be distorted.

300

4. plate cylinder

34. average

64. stretch

301

5. The second (middle) cylinder is covered with a rubber blanket. As the plate (top) cylinder revolves and comes into contact with the rubber blanket, the image is transferred from the plate cylinder to the new cylinder. This second or (middle) cylinder is called the _____.

35. After the plate has been miked and the correct amount of packing determined, it must be mounted on the plate cylinder. All plates have a gripper edge and a trailing edge. When mounting the plate on the plate cylinder, the _____ edge of the plate is secured in position first. Be sure to set the press off-on switch to the "SAFE" position.

65. Before mounting the blanket, the pressman should insure that the press is in the "SAFE" position. After determining this, he then must remove the cylinder guard. The guard should never be removed unless the press switch is in the _____ position.

317

302

5. blanket cylinder

35. gripper

65. SAFE

6. In order to complete this process and have our sheet of paper receive the image being printed, we must have a third (bottom) cylinder that must cause contact between the paper and the _____.

36. There is a gap in the plate cylinder that contains two plate clamps which extend across the length of the cylinder. The two clamps are identified as the top and bottom _____. Their purpose is to hold the plate tight on the plate cylinder.

(SEE FIGURE 5)

66. Since a plate cannot be properly mounted unless the blanket cylinder has a blanket on it, the blanket is always mounted before the plate. It would be impossible to obtain the proper squeeze when mounting a plate, if the _____ was not mounted first.

304

6. blanket cylinder

36. plate clamps

66. blanket

7. This third (bottom) cylinder has a smooth steel surface and as it revolves around in unison with the plate and blanket cylinders, it causes the sheet of paper to be pressed against the rubber blanket and an impression is made on the paper from the image carried on the blanket cylinder. This third (bottom) cylinder is called the _____.

37. When mounting a plate, the _____ edge is attached first by securing it into the top plate clamp of the plate cylinder. Remember, there are two plate clamps, referred to as _____ and bottom plate clamps.

(SEE FIGURE 5)

67. When a plate and a blanket are both to be mounted around their respective cylinders, the pressman should always mount the _____ before the _____. He should also re-tighten the blanket around the cylinder after several hundred impressions in order to remove the initial _____.

306

7. impression cylinder

37. gripper, top

67. blanket, plate, stretch

14

322

8. After the image has been offset to the paper, due to contact with the blanket cylinder, the printed sheet continues through the cycle and is deposited at the delivery end of the press. The transfer or offset of the image from the plate, to the blanket, and then to the paper, is the reason for calling this method of printing " printing."

38. In order to prepare the plate clamp to receive the gripper edge of the plate, the clamp first must be loosened by turning the quoins and registration screws counter-clockwise. The clamp must have some way to grip the edge of the plate and hold it in position. This is accomplished by the and .

68. After the press has been put on and the cylinder guard removed, the pressman should make the blanket and obtain enough packing paper to total , which as we learned earlier is the correct total thickness of the blanket and its packing.

308

8. offset

38. top, quoin keys, tension screws

68. SAFE, .073

309

9. Offset printing then is a system whereby the image to be reproduced is applied to the paper stock being printed through a cylinder assembly containing three cylinders. These three cylinders are _____, _____ and _____.

39. By loosening the _____ and _____, the gripper edge of the plate is permitted to be seated into the plate clamp as far as possible. This prevents it from pulling out of the clamp and helps to insure that it is mounted straight. Always insert with the image side down.

69. When mounting plates or blankets, the press should always be turned manually. To insure that safety is practiced as much as possible, the press should never be turned by power when mounting plates and blankets, but should be turned _____.

325

9. plate, blanket, impression

39. quoin keys, tension screws

69. manually

10. At the ends of the plate and blanket cylinders the surface of the cylinder is raised. These raised surfaces are called bearers. The purpose of the bearer is to maintain correct separation of the cylinder surfaces. The raised surfaces encircling the ends of the plate and blanket cylinders are called _____.

(SEE FIGURE 1)

40. Before tightening the quoin keys and tension screws, the plate should be horizontally centered in the clamp. This is accomplished either by aligning the gripper mark on the plate with the scribed center line on the top plate clamp or by aligning the right edge of the plate with the right edge of the cylinder surface. Either way insures us of having the plate _____ on the cylinder.

(SEE FIGURE 5)

70. When mounting the blanket, place one blanket bar on the lower surface of the gap in the blanket cylinder. Remember to have the rubber side of the blanket up. There are two places to attach the blanket bars in the cylinder gap, but we must fasten the blanket bar to the _____ surface of the gap first.

3/2

10. bearers

40. horizontally centered

70. lower

313

11. Since the impression cylinder is a smooth, steel surfaced cylinder and separation from the other cylinders is controlled manually, it doesn't need raised surfaces (bearers) at each end. Therefore, the impression cylinder does not have _____.

41. Once the plate is properly centered and seated in the top plate clamp, the top plate clamp may be tightened. In order to position the plate around the cylinder properly, the press must be "ON" impression. The plate and blanket cylinders do not contact each other unless the press is _____ impression.

71. The blanket bar is fastened to the _____ surface of the cylinder gap with three bolts. The three bolts are inserted and tightened after the three holes in the blanket bar are aligned with the three threaded holes in the cylinder gap surface.

329

314

11. bearers

41. ON

71. lower

12. Cylinder and bearer surfaces should be kept clean. Two of the most common substances accumulated are ink and gum. The ink deposits are caused by careless washing-up of the press and gum deposits from careless application when preserving the plate. If the cylinder and bearer surfaces are not kept clean, an accumulation of ___ and ___ will result.

42. To allow the plate and blanket cylinders to contact each other, the press must be put ___ impression. We must insure that the ink rollers do not contact the plate as they normally do, automatically, when the press goes "ON" impression. Therefore, the operator must lock up the ink rollers with the ink motion throw-off handle.

(SEE FIGURE 6)

72. The pressman should then turn the press by hand, leaving the power switch in the ___ position. He should insert the proper amount of packing paper behind the blanket as he continues to turn the cylinder forward until the blanket covers the entire ___ cylinder, and the free blanket bar is at the top of the cylinder gap.

316

12. ink, gum

42. ON

72. SAFE, blanket

13. The best way to remove ink from the surfaces is with solvent, while the best way to remove gum from the surfaces is with water. Two necessary items for cleaning cylinder and bearer surfaces then are _____ and _____.

43. After locking up the ink rollers with the ink motion _____ handle, a small piece of paper must be placed under the automatic trip, which is located on the feeder board. The press will stay ON impression as long as a piece of paper remains under the _____. The automatic trip will cause the press to go off impression if a sheet fails to feed.

73. The pressman is now ready to attach the other end of the blanket to the reel rod. Since there must be a way to adjust the amount of tension on the blanket, the device to accomplish this is known as the _____.

318

13. solvent, water

43. throw-off, automatic trip

73. reel rod

14. When the press is idle for a period of 24 hours or longer, the surfaces of the cylinders and bearers must be protected from rust. The best way to prevent rust from occurring is to apply a light coat of oil. Many times rust occurs sooner than you would think possible. However, if a light coat of is applied, rust can be prevented. Rust can be removed with crocus cloth and oil.

44. The last step in putting the press "ON" impression is to depress the impression throw-on lever. This action brings the plate and blanket cylinder into contact with each other due to the eccentric movement of the blanket cylinder. We must depress the lever, in order for the plate and blanket cylinders to contact each other.

74. The free blanket bar is attached to the reel rod with three bolts in the ~~same~~ manner as the other end of the blanket was secured to the cylinder. The tension on the blanket is controlled by the amount of tension put on the .

320

14. oil

44. impression throw-on

74. reel rod

15. Since the plate cylinder must hold the printing plate and the blanket cylinder must hold the rubber blanket, the construction of those two cylinders are designed to allow for them. The cylinders must be undercut below their bearer surfaces to permit the plate and blanket to be mounted. The recess of the cylinder surface in relation to its bearers is called cylinder _____.

45. After the gripper edge of the plate is secured in the top plate clamp and the press has been put "ON" impression by depressing the "Impression _____" lever, the correct amount of packing paper may be inserted.

75. The reel rod tension is controlled by a ratchet and pawl which is located on the fly-wheel side at the end of the reel rod. The other end of the reel rod is square. To take up the tension, the pressman should hold his left hand on the pawl and press it into the ratchet while he pulls down on the square end of the reel rod with a wrench in his right hand. The _____ and _____ hold the desired blanket tension.

15. undercut

45. throw-on

75. ratchet, pawl

16. Because of the difference in the thickness between a plate and a rubber blanket, each cylinder has its own amount of undercut. For the plate cylinder this amount is .015". Therefore, we can say that the _____ of the plate cylinder is .015".

46. The press may then be turned by hand until the plate covers the plate cylinder. Insert the trailing edge of the plate into the bottom plate clamp. Tighten the plate clamp and take out slack with the tension screws. The removing of slack in the plate is important; consequently, the _____ must be tightened.

76. The tautness of the blanket may be determined by tapping with the finger the surface of the blanket between the reel rod and the tail edge of the blanket. It is the _____ and _____, however, that controls the tension.

324

16. undercut

46. tension screws

76. ratchet, pawl

17. The rubber blanket is thicker than the plate; therefore, the undercut of the blanket cylinder will have to be greater than the undercut of the plate cylinder. The undercut of the blanket cylinder is .071". The undercut of the blanket cylinder is much greater than that of the plate cylinder which is ____.

47. It is important to remember that the blanket cylinder has an eccentric movement and it is the _____ that moves when the press is thrown on impression.

77. In order to remove the blanket, the pressman must first release the tension from the _____, remove the _____ bolts holding the blanket bar to the reel rod and turn the press backwards by hand, as the power switch should be in the _____ position.

326

17. .015"

47. blanket cylinder

77. reel rod, three, SAFE

327

18. When we speak of cylinder undercuts we are referring to two cylinders. The plate cylinder which has an undercut of .015" and the blanket cylinder which has an undercut of _____.

48. After the plate has been mounted on the _____ cylinder it is still possible to move the position of the image by either twisting the plate or swinging the plate cylinder. The two ways to make register adjustments to the plate are _____ the plate and _____ the plate cylinder.

78. The press should be turned backwards until the blanket is off the cylinder and then the pressman should remove the three bolts which hold the other _____ to the cylinder. Packing paper should be discarded if it is wrinkled or damaged.

313

328

18. .071"

48. plate, twisting, swinging

78. blanket bar

19. In addition to the packing under the plate and blanket to allow for the undercuts, an additional .003" of packing between the two cylinders is necessary to allow for proper squeeze or contact between the plate and blanket. This overall packing of _____ above the bearers is required for proper image transfer.

49. The plate may be twisted after it has been mounted on the cylinder. The maximum amount it should be twisted is 1/8 of an inch. The purpose of twisting a plate is to correct a crooked image. This allows the plate to be shifted on the cylinder. It is important, however, that the _____ amount of twist is no more than _____.

79. The cylinder assembly has a third cylinder which we learned earlier is called the bottom cylinder or impression cylinder. It is a smooth steel cylinder and differs from the plate and blanket cylinders due to having no bearers or undercut. The cylinder in the assembly which has no bearers or undercut is called the _____ cylinder.

330

19. .003"



49. maximum, 1/8 of an inch

79. impression

20. By overpacking the plate cylinder .001" and the blanket cylinder .002" above their bearers, we can distribute the amount of overpacking required for proper image transfer which is ____.

50. The swinging of the plate cylinder allows the entire plate cylinder to be advanced or retarded in relation to the blanket cylinder. The plate cylinder may be swung 1 1/2 inches. This movement increases or decreases the margin to the gripper edge of the sheet depending upon the direction it is swung. The maximum distance it can be swung, however, is _____.

(SEE FIGURE 7)

80. It is the _____ cylinder which actually presses the sheet being printed against the blanket cylinder causing an impression to be made. An impression can only be made when the press is thrown "ON" impression.

332

20. .003"

50. 1 1/2 inches

80. impression

40

348

333

21. Packing of the cylinders is accomplished by using packing paper which comes in various degrees of thickness. Therefore, when determining the proper amount of packing required under the plate and blanket, we must determine how much _____ will be required under each.

51. We can say then that there are two register adjustments which can be made to the plate cylinder. They are _____ and _____.

81. All offset presses are equipped with trips, which when activated, cause the blanket cylinder to move away from the plate and impression cylinders. This action causes the press to _____ off impression and stops the printing cycle.

349

334

21. packing paper

51. twist, swing

81. trip

22. Since the undercut of the plate cylinder is .015" and we must overpack the plate cylinder .001" to allow for proper squeeze, the total thickness of the plate and the packing paper under it should be _____.

52. The maximum amount of twist is _____ and the maximum amount of swing is _____.

82. There are two types of trips, manual and automatic. It is safe to say then that in order to stop a press from making the printing cycle, it can be done by the pressman activating the _____ trip or by a sheet failing to feed causing the _____ trip to be activated.

336

22. .016"

52. 1/8 inch, 1 1/2 inch

82. manual, automatic

337

23. The undercut of the blanket cylinder is .071" and we must overpack the blanket cylinder .002" to allow for proper squeeze, the total thickness of the blanket and the packing paper under it should total ____.

53. In order to twist the plate, we must loosen the bottom plate clamp so that the plate is free to move. The plate is then twisted by tightening the tension screw on the top plate clamp on the side that you wish the image brought down. After the move has been made, retighten the clamps. Remember, however, to always loosen the ____ plate clamp first.

(SEE FIGURE 7)

83. The mechanism which causes a press to go "OFF" impression is called a _____. There are two types, _____ and _____.

353

338

23. .073"

53. bottom

83. trip, manual, automatic

339

24. The combined total of the plate cylinder undercut, the blanket cylinder undercut and the amount of over packing above the bearers to allow for proper squeeze is _____.

54. When the image is parallel with the gripper edge of the sheet, we can change the margin from the edge of the sheet by _____ the plate cylinder.

84. To allow for various thickness of stock and permit the correct .003 inch printing pressure, the impression cylinder has what is known as the impression cylinder adjustment handle. This is a very important adjustment and, in order to print with the correct printing pressure, the pressman must accurately adjust the _____.

(SEE FIGURE 9)

355

340

24. .089"

54. swinging

84. impression cylinder adjustment handle

25. To insure that we obtain the proper amount of packing under the plate and blanket, a device called a micrometer is used. Since the contact between the plate and blanket cylinders is of extreme importance for proper image transfer, the _____ is a vital tool for the offset pressman.

(SEE FIGURE 2)

55. To swing the plate cylinder, it must be freed by loosening the four locking screws on the fly-wheel side of the cylinder. Then insert the plate cylinder pinion wrench into the gear segment and move the cylinder either up or down the desired distance. Then re-tighten the four _____ on the fly-wheel side of the cylinder.

(SEE FIGURE 7)

85. The impression cylinder adjustment handle is located on the operator's side of the press behind the automatic pile receder. To increase pressure, loosen the star nut and press the handle down. To decrease the pressure lift the handle up. The handle is easily accesible to the pressman due to its being located on the _____ of the press.

342

25. micrometer

55. locking screws

85. operator's side

343

26. In order to accurately measure the thickness of the blanket, plate and packing, we need to measure to the nearest .001 of an inch. This accuracy in measurement is accomplished by the use of a _____.

56. Remember, that to correct a crooked image we _____ the plate on the plate cylinder and to increase or decrease the margin from the gripper edge of the sheet we _____ the plate cylinder.

86. If the handle is moved 1/8 inch, it will increase or decrease the pressure between the blanket and impression cylinders by .001 inch. Therefore, it can be said that _____ movement of the impression cylinder adjustment handle equals a change in the pressure of _____ inch.

359

344

26. micrometer

56. twist, swing

86. 1/8 inch, .001

27. Reading a micrometer is a simple task. The piece of material being measured is placed between the two measuring surfaces which are called the anvil and spindle. Actually then, any reading we receive on the instrument is determined by the distance between the _____ and _____ at the time of the reading.

(SEE FIGURE 2)

57. When it is necessary for the pressman to twist and swing the plate, the plate should always be twisted first. The paralleling of the image to the gripper edge of the sheet is important and it is much easier to accomplish if the plate is _____ before it is swung.

87. In addition to twisting a plate and swinging the plate cylinder, it is also possible to change the size of the image being printed (for better fit) by adjusting the packing paper of the plate and blanket cylinders. This is only good for a size change of a fraction of an inch and then only after changing the packing of the _____ and _____ cylinders.

346

27. anvil, spindle

57. twisted

87. plate, blanket

28. In order that good contact is made between the two measuring surfaces which are the _____ and _____ and the piece of material between them that is being measured, the movement of the spindle can be controlled by the ratchet stop.

(SEE FIGURE 2)

58. In addition to mounting the plate on the _____ cylinder, the pressman must also mount the blanket on the blanket cylinder. The rubber blanket has steel bars attached to each end of the blanket. These bars are known as _____.

(SEE FIGURE 8)

88. Changing the image size will only apply to the image around the cylinder and not across the cylinder. A simple rule to follow is to remember that the image will change a fraction of an inch larger or smaller depending upon the packing change to the blanket. Adding to the blanket from the plate will increase the image size and adding to the plate from the blanket will decrease the image size _____ the cylinder.

348

28. anvil, spindle

58. plate, blanket bars

88. around

399

29. The ratchet stop is turned clockwise until it begins to click. The clicking sound indicates that sufficient contact now exists and the clockwise rotation of the _____ may be terminated and a reading made.

59. The purpose of the blanket bars is to furnish a means for attaching the blanket to the _____ cylinder. The blanket bars are thin pieces of steel the same width as the rubber blanket. Each of the blanket bars consists of two pieces known as the upper and under blanket bars. The two bars are held together with screws and when assembled, the rubber blanket is between the _____ and _____ blanket bars.

89. To increase the image size a fraction of an inch around the cylinder, the pressman should take packing from the _____ cylinder and add it to the _____ cylinder. The reverse action would decrease the image size.

29. ratchet stop

59. blanket, upper, under

89. plate, blanket

30. Two scales on the micrometer are used to make the reading. One is located on the barrel and is read horizontally. The other scale is around the thimble, perpendicular to the horizontal scale, and is read vertically. The reading is obtained by reading the two scales together and the scales are located on the _____ and _____.

(Return to page 1 and continue with LEVEL B)

60. When attaching the blanket _____ to the new blanket, the pressman must be sure that the bars are mounted at right angles to the direction of the arrow found on the back side of the blanket. If the bars are not mounted at _____ to the direction of the arrow on the back side of the blanket, the blanket stretch will occur in the wrong direction.

(Return to page 1 and continue with LEVEL C)

90. A good rule to remember when changing packing between the plate and blanket cylinders in order to change the image size around the cylinder, is that whatever is done to the _____ cylinder, the image is affected in the same manner.

YOU HAVE COMPLETED THE PROGRAM FRAMES. NOW
TURN TO PAGE 65 AND COMPLETE THE SELF-TEST

30. barrel, thimble

60. bars, right angles

90. blanket

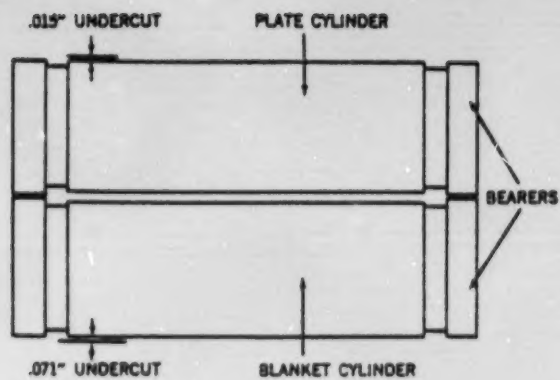


FIGURE 1

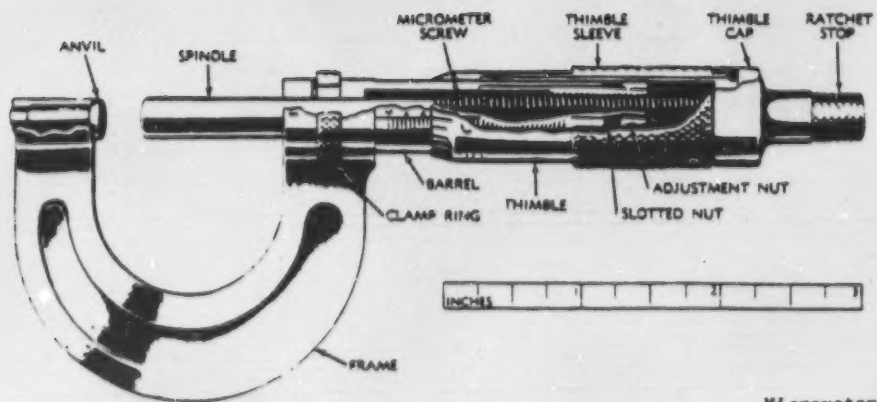


FIGURE 2

354



FIGURE 3



FIGURE 4

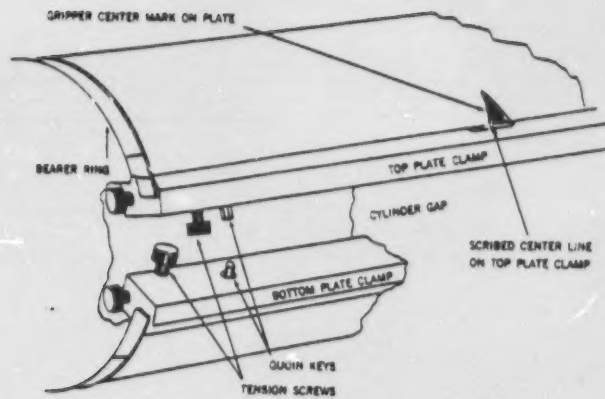


FIGURE 5

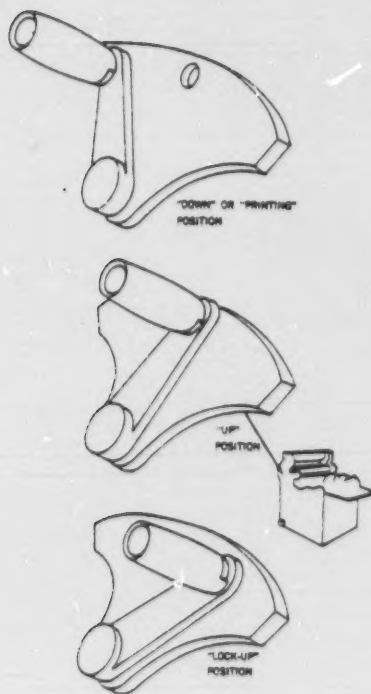


FIGURE 6

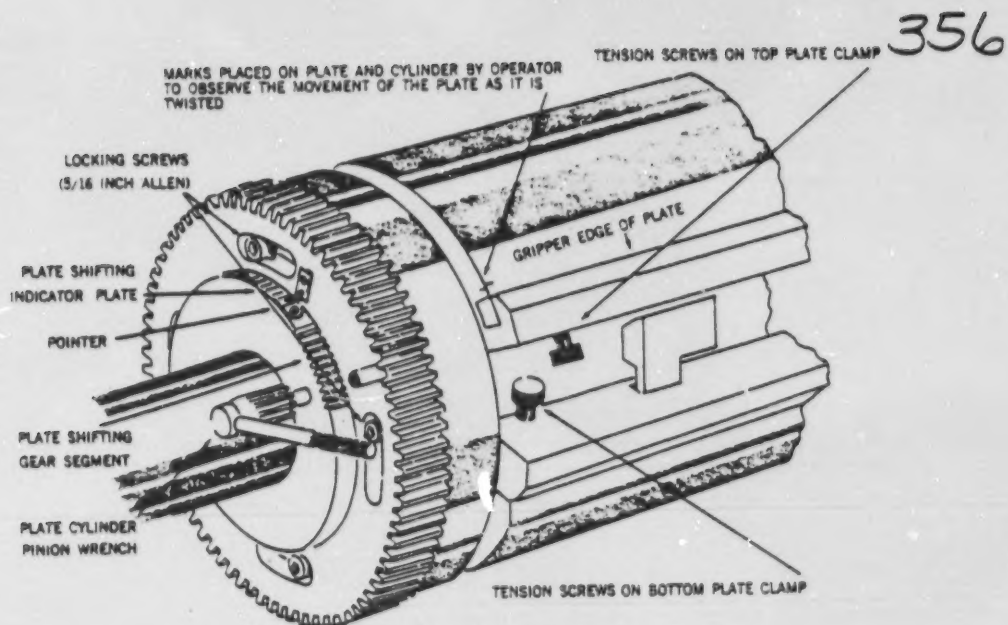


FIGURE 7

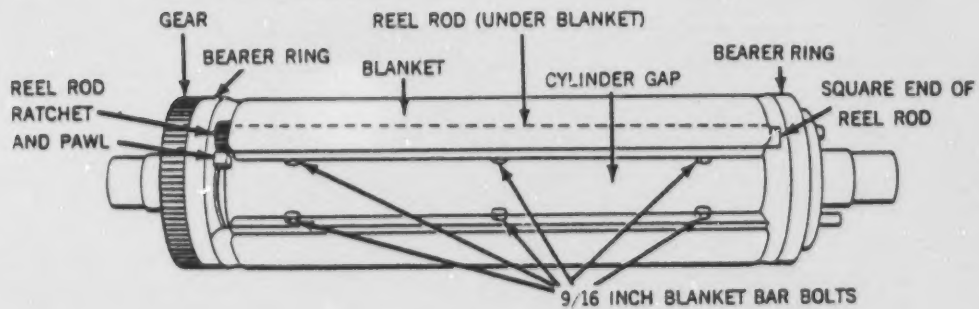


FIGURE 8

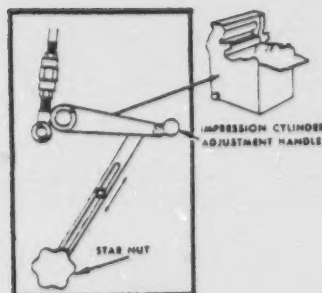


FIGURE 9

SELF-TEST

(If you are not sure of your answer, check the appropriate frame as indicated by the numbers in parentheses at the end of each question.)

1. Name the three main cylinders of an offset printing press. (#3, #5, #7)
2. What are the functions of each of the three cylinders? (#3, #5, #7)
3. What do we use to remove gum from the surface of cylinders and bearers? (#13)
4. What do we use to remove ink from the surface of cylinders and bearers? (#13)
5. How do we remove rust from the surface of cylinders and bearers? (#14)
6. What should be applied to cylinder and bearer surfaces when the press is to remain idle for a period of 24 hours or more? (#14)
7. What is cylinder undercut? (#15)
8. How much undercut do we find on the plate cylinder? (#16)
9. How much undercut do we find on the blanket cylinder? (#17)
10. What is cylinder packing? (#19)
11. How much total packing including the undercuts, should be used for proper image transfer? (#15, #17, #19)
12. How much packing under the plate? (#22)
13. How much packing under the blanket? (#23)
14. What is a micrometer? (#25, #26)
15. A micrometer is accurate to what degree? (#26)
16. How much packing above the bearers is considered proper printing pressure? (#19)
17. What is the correct way to make a blanket and a plate? (#33, #34)
18. What are blanket bars? (#58, #59)
19. Why should blanket tension be re-adjusted after stretch? (#64)
20. What are plate clamps? (#36)
21. Does the impression cylinder have bearers? (#11, #79)
22. Is the impression cylinder adjustable? (#84, #85, #86)
23. What are impression cylinder trips? (#43, #82)
24. Which cylinder moves when the press goes on impression? (#47)
25. Why do we twist a plate? (#49)
26. What determines which side of the plate we twist? (#53)
27. What is cylinder swing? (#50)
28. Which do we do first, twist or swing? (#57)
29. What is the maximum distance a plate should be twisted? (#49)
30. What is the maximum distance the plate cylinder can be swung? (#50)

358

31. Why would we want to change the image size? (#87)
32. How would we make the image print larger? (#88)
33. How would we make the image print smaller? (#88)

LESSON PLAN

PREPARE DAMPENING ASSEMBLY
740-303-A-020-030

OFFSET PRINTING COURSE



July 1974

DEFENSE MAPPING SCHOOL — FORT BELVOIR, VIRGINIA

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This publication supercedes LRF T.440-109 June 69 Prepare Dampening Assembly

7/74

ORIENTATION SHEET
OFFSET PRINTING COURSE

SEGMENTS

PRESS
FUNDAMENTALS
(104 Hours)

BLOCKS

Course Introduction
(14 Hours)

MAJOR ASSEMBLIES OF
THE OFFSET PRESS
(90 Hours)

LESSONS

Prepare Controls,
Feeder And Delivery
Assemblies
(28 Hours)

Prepare Cylinder
Assembly
(19 Hours)

PREPARE DAMPENING
ASSEMBLY
(19 Hours)

Prepare Inking
Assembly
(24 Hours)

Offset Press Operating
Procedures
(172 Hours)

LESSON REQUIREMENTS SHEET

COURSE: Offset Printing Course

LESSON: Prepare Dampening Assembly

OBJECTIVE: Provided with an offset press (LXG or ATF-DP), press tools, feeler strips, list of safety rules, TM 5-245 and Harris Operating Manual, the students will properly install all dampening rollers, make the necessary adjustments, explain and position the various controls and explain the overall adjustment to the ductor roller, in accordance with procedures outlined in the manuals provided. He must achieve a grade of 70 to successfully complete this graded exercise.

TIME: 19 Hours: 2D, 15PE, 2E

TRAINING AIDS AND DEVICES:

1. Audio-Visual Aids or Devices: None
2. DA Training Aids: None
3. Service Training Aids:
 - a. #A-109-57 Schematic drawing of a typical offset press
 - b. #740-051-0303-B CCTV tape

MATERIALS AND SUPPLIES:

- | | |
|------------------|-------------|
| 1. Feeler strips | As required |
| 2. Wiping rags | As required |

EQUIPMENT: None

TRAINING AREA:

- Indoor: 1. 30-man classroom equipped with desks, chairs and chalkboard.
2. Pressroom equipped with one offset press and workbench with tool set for each group of designated students.

Outdoor: None

TRANSPORTATION REQUIREMENTS: None

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ADDITIONAL PERSONNEL AND DEMONSTRATION TROOPS:

1. Assistant Instructors:

- a. Demonstration: One Assistant Instructor per designated group.
- b. Practical Exercise: Six Assistant Instructors.

TEXT REFERENCES:

- 1. Instructor References: TM 5-245 (7-70), Offset Photolithography and Map Reproduction, Chap 8, Section VI.
Harris Operating Manual, para 24 and 108 thru 112.
- 2. Student References: TM 5-245 (7-70), Offset Photolithography and Map Reproduction, Chap 8, Section VI.
Harris Operating Manual, para 24 and 108 thru 112.
- 3. Average Student Homework Time: 2 Hours

TRAINING AIDS

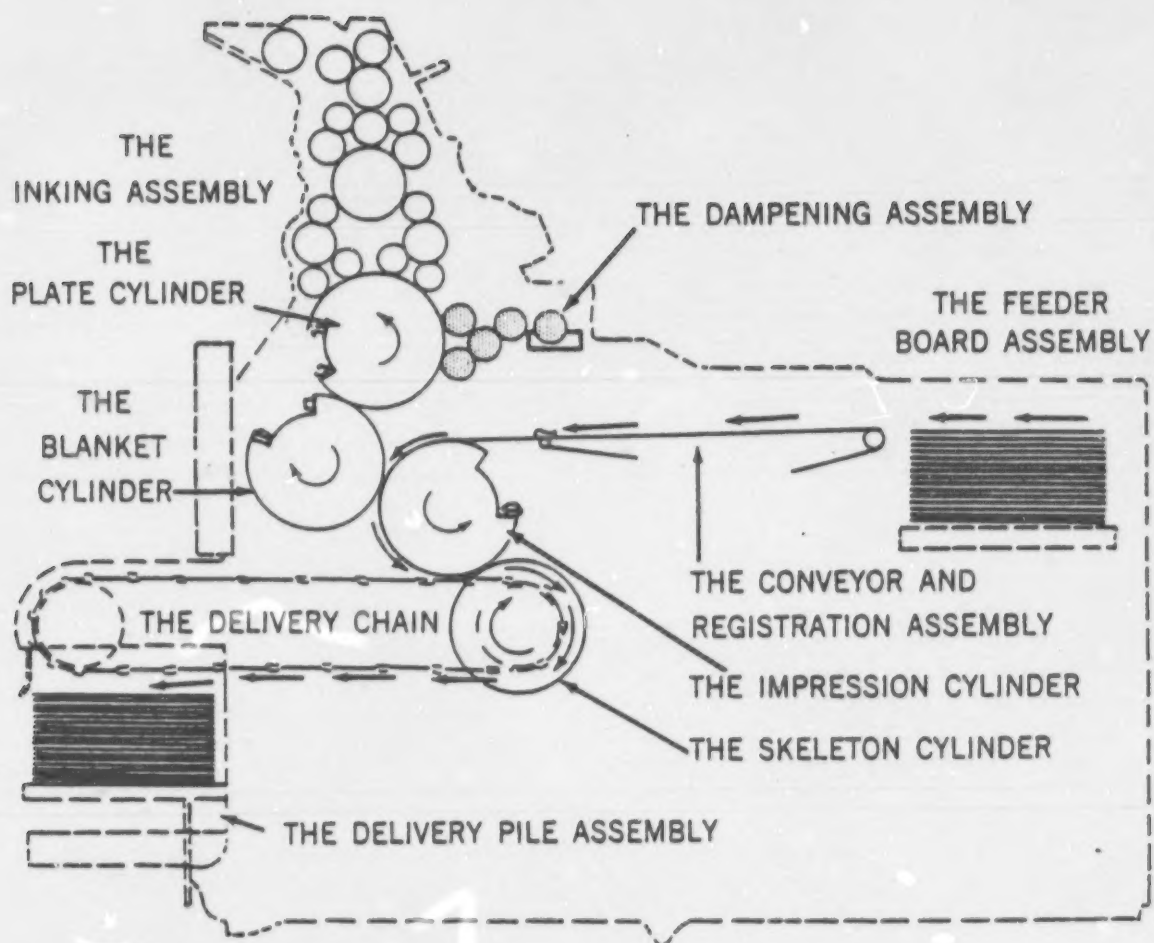


Figure 1 #A-109-57 Schematic drawing of a typical Offset Press

ANNEX A to
Lesson Requirement Sheet

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LESSON OUTLINE

LESSON: Prepare Dampening Assembly

TIME	SUBJECT MATTER OUTLINE	INSTRUCTIONAL TACTICS
	<u>INTRODUCTION</u> 00:00 During the last block of instruction, PREPARE CYLINDER ASSEMBLY, you learned the proper procedure involved in determining the correct amount of packing necessary to install both the blanket and plate according to the manufacturer's specifications. During this class, PREPARE DAMPENING ASSEMBLY, you will learn the procedures used to properly install and make adjustments to the rollers in the Dampening Assembly, you will also learn the operation and the function of the various controls. Following this demonstration be prepared to answer the following questions: 1. Which roller in the Dampening Assembly is not adjustable? 2. What is the function of the vibrator roller? 3. What two rollers does the ductor roller come in contact with during operation?	Using the Schematic drawing, Fig 1, #A-109-57, show and explain the rollers which make up the Dampening Assembly. At the beginning of the class the instructor will show a fabric covered roller covered with ink. Explain what might have caused this problem and how it will affect the printed sheet. Explain the solution to remedy this problem. List key questions on the blackboard with chalk so that the students can see them throughout the demonstration. Prior to the demonstration distribute programmed text. Students will be divided into groups of 6 during this demonstration, with one instructor demonstrating, at each press, using the dampening assembly. He will identify the various component parts and explain their operation and function. Refer to Supplement Source Material #1 for location function, installation

TIME	SUBJECT MATTER OUTLINE	INSTRUCTIONAL TACTICS
		and adjustment of the Dampening Assembly. NOTE TO INSTRUCTOR: Due to the simultaneous instruction of the two types of presses, the development of this lesson is divided into two parts. Development #1 which pertains to the ATF-DP press and Development #2, the Harris LIG press.
00:08	<u>DEVELOPMENT #1</u> ATF-DP Offset Press 1. CONSTRUCTION OF THE DAMPENING ASSEMBLY (ATF-DP) a. Water pan b. Fountain roller c. Ductor roller d. Vibrator rollers e. Form rollers	Explain and point out the location and function of each roller. Ask questions to check student understanding.
00:20	2. CONTROLS a. Water motion throw-off handle and latch (1) Position #1 (2) Position #2 (3) Position #3 b. Water-on lever (1) On (2) Off c. Water-motion control unit	Explain and point out the location, demonstrate the operational function. Check student understanding by asking questions.
		BREAK AT INSTRUCTOR'S DISCRETION

TIME	SUBJECT MATTER OUTLINE	INSTRUCTIONAL TACTICS
00:35	3. ADJUSTING THE DAMPENING ASSEMBLY ROLLERS a. Form rollers (1) Top form roller (2) Bottom form roller b. Fountain roller c. Ductor roller	Explain the correct procedure involved in the installation and adjustment of the rollers. See Appendix 2 to Student Practical Exercise. Ask questions to check student understanding.
00:55	4. CARE AND CLEANING OF THE ROLLERS a. Metal rollers b. Fabric covered rollers	Explain and demonstrate cleaning the rollers. Check student understanding by asking questions. At the conclusion of this demonstration the students will be given 15 hours of practical exercise, followed by a 2 hour graded practical exercise.
01:20	5. CRITIQUÉ a. Repose key questions b. Clarify any misconceptions	
01:30	(QUESTIONS AND COMMENTS PERIOD)	
		BREAK AT INSTRUCTOR'S DISCRETION
	<u>APPLICATION</u>	15 Hr PE, 2 Hr GPE Student understanding was checked throughout the lesson by Instructor. (See Instructional Tactics) Students are to perform Practical Exercise.
		BREAK AT INSTRUCTOR'S DISCRETION

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TIME	SUBJECT MATTER OUTLINE	INSTRUCTIONAL TACTICS
	<u>SUMMARY</u>	
01:40	During the last 19 hours of instruction you installed and adjusted the rollers within the Dampening Assembly. Although this may have seemed to be quite easy the proof of your ability will not come to light until you actually begin to produce printed copies. Remember that a heavy roller setting can cause just as many problems as a light setting, getting proper pressure is something that can only come with practice. In your next lesson PREPARE INKING ASSEMBLY, you will be able to further your training pertaining to roller setting by adjusting the various ink rollers using the same procedures and skills acquired in this block of instruction.	

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LESSON OUTLINE

LESSON: Prepare Dampening Assembly

TIME	SUBJECT MATTER OUTLINE	INSTRUCTIONAL TACTICS
	<u>INTRODUCTION</u>	
00:00	During the last block of instruction, PREPARE CYLINDER ASSEMBLY, you learned the proper procedure involved in determining the correct amount of packing necessary to install both the blanket and plate according to the manufacturer's specifications. During this class, PREPARE DAMPENING ASSEMBLY, you will learn the procedures used to properly install and make adjustments to the rollers in the Dampening Assembly, you will also learn the operation and the function of the various controls. Following this demonstration be prepared to answer the following questions: 1. What adjustment is required between the ductor roller and the vibrating roller? 2. Which cam determines the length of time the ductor roller is in contact with the fountain roller? 3. What is the function of the ductor roller?	Using the Schematic drawing, Fig 1, #A-109-57, show and explain the rollers which make up the Dampening Assembly. At the beginning of the class the instructor will show a fabric covered roller covered with ink. Explain what might have caused this problem and how it will affect the printed sheet. Explain the solution to remedy this problem. List key questions on the blackboard with chalk so that the students can see them throughout the demonstration. Prior to the demonstration, distribute programmed text. Students will be divided into groups of 6 during this demonstration, with one instructor demonstrating, at each press, using the dampening assembly. He will identify the various component parts and explain their operation and function. Refer to Supplement Source Material #2 for location function, installation

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TIME	SUBJECT MATTER OUTLINE	INSTRUCTIONAL TACTICS
		and adjustment of the Dampening Assembly. NOTE TO INSTRUCTOR: Due to the simultaneous instruction of the two types of presses, the development of this lesson is divided into two parts. Development #1 which pertains to the ATF-DP press and Development #2, the Harris LIG press.
00:08	<u>DEVELOPMENT #1</u> HARRIS LIG OFFSET PRESS 1. CONSTRUCTION OF THE DAMPENING ASSEMBLY (LIG) a. Water pan b. Fountain roller c. Ductor roller d. Vibrator roller e. Form rollers 2. CONTROLS a. Operating handle (1) Run position #1 (2) Idle position #2 (3) Wash-up position #3 b. Two cam settings c. Ductor roller control	Explain and point out the location and function of each roller. Ask questions to check student understanding. Explain the function and demonstrate the operation of each control. Check student understanding by asking questions.
		BREAK AT INSTRUCTOR'S DISCRETION
00:35	3. ADJUSTING THE DAMPENING ASSEMBLY ROLLERS a. Form rollers (1) Top form roller (2) Bottom form roller	Explain the correct rotation of installing and adjusting the rollers. See Appendix 4 to student practical exercise.

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TIME	SUBJECT MATTER OUTLINE	INSTRUCTIONAL TACTICS
	Remember that a heavy roller setting can cause just as many problems as a light setting, getting proper pressure is something that can only come with practice. In your next lesson PREPARE INKING ASSEMBLY, you will be able to further your training pertaining to roller setting by adjusting the various ink rollers using the same procedures and skills acquired in this block of instruction.	

INSTRUCTOR NOTES

1. CONSTRUCTION OF THE DAMPENING ASSEMBLY

- a. Historical data: None
- b. Anecdotes: None
- c. Content: The instructor will point out and explain the construction of the rollers and the materials used.
- d. Tactics: This lesson could be effectively presented by the following methods:
 - (1) Use of CCTV tape.
 - (2) Use of programmed text.
 - (3) Use of O/H transparencies.

2. CONTROLS

- a. Historical data: None
- b. Anecdotes: None
- c. Content: The instructor will explain and point out the operational function of the controls.
- d. Tactics: This lesson could be presented by the following methods:
 - (1) Use of CCTV tape
 - (2) Use of programmed text.

3. CARE AND CLEANING OF ROLLERS

- a. Historical data: None
- b. Anecdotes: None
- c. Content: The instructor will explain and demonstrate the proper procedure of cleaning the fabric covered rollers, re-covering the fabric covered rollers and cleaning the metal rollers.
- d. Tactics: This subject could be effectively presented by the following methods:
 - (1) Use of CCTV tape
 - (2) Use of O/H transparencies.

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4. ADJUSTING THE DAMPENING ASSEMBLY ROLLERS

- a. Historical data: None
- b. Anecdotes: None
- c. Content: The instructor will explain and demonstrate the correct adjustment procedure using feeler strips to adjust the rollers.
- d. Tactics: This lesson could be taught by the following methods:
 - (1) Use of CCTV tape.
 - (2) Use of programmed text.

5. EXPLANATION

This lesson was last systems engineered in May 1970.

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STUDENT ADVANCE SHEET

COURSE: Offset Printing Course

LESSON: Prepare Dampening Assembly

OBJECTIVE: Provided with an offset press (LXG or ATF-DP), press tools, feeler strips, list of safety rules, TM 5-245 and Harris Operating Manual, the student will properly install and adjust all dampening rollers. He will explain and operate the various controls and explain the overall adjustment to the ductor roller.

STUDENT

REFERENCES: The following are reading assignments to be accomplished during the Prepare Dampening Assembly instruction period.

1. TM 5-245 (July 70), Offset Photolithography and Map Reproduction, Chap 8, Section VI.
2. Harris LXG Operating Manual, para 24, and 108 thru 112.

SUPPLEMENTARY INFORMATION: Instruction on Prepare Dampening Assembly will be conducted simultaneously on the ATF-DP and the Harris LXG offset presses in the following manner:

1. Demonstration (2 Hours)
 - a. Location, operation and explanation of the controls.
 - b. Installation of the dampening rollers.
 - c. Adjustment of all adjustable rollers.
2. Student practical exercise (15 Hours) The object of this exercise is to enable the student sufficient time to practice installing and adjusting the dampening rollers, operating and explaining the function of the controls. The student must also explain the overall adjustment to the ductor roller. The student must complete this exercise with a minimum of assistance from the instructor.

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STUDENT PRACTICAL EXERCISE

LESSON: Prepare Dampening Assembly

OBJECTIVE: Provided with an offset press (LXG or ATF-DP) press tools, feeler strips, list of safety rules, TM 5-245 and Harris Operating Manual, the student will properly install and adjust all dampening rollers. He will explain and operate the various controls and explain the overall adjustment to the ductor roller.

MATERIALS AND SUPPLIES REQUIRED:

- | | |
|------------------|-------------|
| 1. Feeler strips | As required |
| 2. Wiping rags | As required |

EQUIPMENT: None

FACILITIES: Pressroom equipped with one offset press and workbench with tool set for each group of designated students.

TRANSPORTATION REQUIREMENTS: None

ADDITIONAL PERSONNEL: One instructor per two presses.

STUDENT REQUIREMENTS:

1. Students will perform a visual and manual safety inspection.
2. Students will install and adjust in the prescribed sequence all adjustable rollers.
3. Students will operate the various operational controls.
4. Students will explain the function of the controls.
5. Students will explain the overall adjustment of the ductor roller.

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STUDENT GRADED PRACTICAL EXERCISE

LESSON: Prepare Dampening Assembly

OBJECTIVE: Provided with an offset press (LXG or ATF-DP), press tools, feeler strips, list of safety rules, TM 5-245 and Harris Operating Manual, the student will properly install and adjust all dampening rollers. He will explain and operate the various controls and explain the overall adjustment to the ductor roller.

STUDENT

REFERENCES: The following are reading assignments to be accomplished during Prepare Dampening Assembly instruction period.

1. TM 5-245 (July 70), Offset Photolithography and Map Reproduction, Chap 8, Section VI.
2. Harris LXG Operating Manual, para 24 and 108 thru 112.

REQUIREMENTS:

The student will have two hours to complete the following exercise with 10 Minutes allowed for the instructors critique.

1. Perform a visual and manual safety inspection.
2. Install and adjust in the proper sequence all adjustable rollers.
3. Operate the various controls.
4. Explain the function of the controls.
5. Explain the overall adjustment to the ductor roller.

Appendix 1 to
Student Practical Exercise
7/74

PREPARE DAMPENING ASSEMBLY

DETAILED PROCEDURE SHEET #1

(ATF-DP)

1. INSTALLATION OF THE TOP FORM ROLLER

- a. Remove socket caps
- b. Place top form roller into its brackets
- c. Replace socket caps
- d. Secure thumbscrews

2. PARALLEL TOP FORM ROLLER TO PLATE

- a. Position assembly in the #1 position
- b. Insert feeler strips in their appropriate position between the plate and form roller
- c. Turn adjusting screws clockwise to decrease the pressure and counter clockwise to increase the pressure
- d. Secure all adjustments
- e. Do not remove feeler strips.

3. ADJUST TOP FORM ROLLER TO VIBRATOR ROLLER

- a. Position assembly in the #3 position.
- b. Insert feeler strips in their appropriate position between the vibrator and form roller
- c. Turn adjusting screws clockwise to decrease the pressure and counter clockwise to increase the pressure
- d. Do not remove feeler strips

4. ADJUST TOP FORM ROLLER TO PLATE

- a. Position assembly in the #1 position
- b. Recheck adjustments
- c. Secure all adjustments
- d. Remove all feeler strips

5. REMOVE TOP FORM ROLLER

- a. Loosen thumbscrews
- b. Remove socket caps
- c. Remove top form roller

6. INSTALLATION OF THE BOTTOM FORM ROLLER

- a. Position assembly in #3 position
- b. Insert bottom form roller in its brackets

7. PARALLEL BOTTOM FORM ROLLER TO PLATE
 - a. Position assembly in #1 position
 - b. Insert feeler strips in their appropriate position between the plate and form roller
 - c. Turn adjusting screws clockwise to decrease pressure and counter-clockwise to increase the pressure
 - d. Secure all adjustments
 - e. Do not remove feeler strips
8. ADJUST BOTTOM FORM ROLLER TO VIBRATOR ROLLER
 - a. Position assembly in #3 position
 - b. Insert feeler strips in their appropriate position between the vibrator and form roller
 - c. Turn adjusting screws clockwise to decrease pressure and counter-clockwise to increase the pressure
 - d. Secure all adjustment
 - e. Do not remove feeler strips
9. ADJUST BOTTOM FORM ROLLER TO PLATE
 - a. Position assembly in #1 position
 - b. Recheck adjustments
 - c. Secure all adjustments
 - d. Remove all feeler strips
 - e. Do not remove the bottom form roller
10. REINSTALL TOP FORM ROLLER
 - a. Position assembly in #3 position
 - b. Repeat steps 1a, b, c & d
11. INSTALLATION OF THE FOUNTAIN ROLLER
 - a. Insert fountain roller in its bracket
 - b. Ensure fountain roller gear meshes with the drive gear
12. INSTALLATION OF THE DUCTOR ROLLER
 - a. Remove roller cap
 - b. Place ductor roller into its bracket
 - c. Replace roller cap
 - d. Secure thumbscrews
13. PARALLEL FOUNTAIN ROLLER TO THE DUCTOR ROLLER
 - a. Position the water on and off lever in the on position
 - b. Rotate press manually until the ductor roller activating mechanism is on high point of the cam

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- c. Insert feeler strips in their appropriate position between the fountain roller and ductor roller
- d. Loosen hexagon bolt (on operator side)
- e. Move bracket manually to parallel fountain roller to ductor roller
- f. Secure hexagon bolt
- g. Remove feeler strips

14. ADJUST OVERALL PRESSURE BETWEEN DUCTOR AND FOUNTAIN ROLLER

NOTE: This adjustment should be made only by a press erector or Senior Instructor.

- a. Rotate press manually until the ductor roller activating mechanism is on high point of the cam
- b. Insert feeler strips in their appropriate position between the ductor and fountain roller
- c. Loosen locking allen screw
- d. Turn adjusting screw counter-clockwise to increase and clockwise to decrease the pressure
- e. Secure adjustment
- f. Remove feeler strips

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PREPARE DAMPENING ASSEMBLY

OUTLINE PROCEDURE SHEET #1

(ATF-DP)

1. Installation of the top form roller.
2. Parallel top form roller to plate.
3. Adjust top form roller to vibrator roller.
4. Adjust top form roller to plate.
5. Remove top form roller.
6. Installation of bottom form roller.
7. Parallel bottom form roller to plate.
8. Adjust bottom form roller to vibrator roller.
9. Adjust bottom form roller to plate.
10. Re-install top form roller.
11. Installation of the fountain roller.
12. Installation of the ductor roller.
13. Parallel fountain roller to the ductor roller.
14. Adjust overall pressure between ductor roller and fountain roller.

NOTE: This adjustment should be made only by a press erector or senior instructor.

Appendix 2A to
Student Practical Exercise

7/74

ROSTER NO.

GRADE

WYS	PEN	CRS
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- /1/2/3/4/5/6/7/8/ X 2 points each violation

TOTAL	150
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Appendix 3 to SPE

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(DP)
PRACTICAL EXERCISE TEST
DAMPENING ASSEMBLY
INSTRUCTOR'S CUT SHEET

STUDENT TIME ALLOWED: 01:50 minutes

INSTRUCTOR TIME ALLOWED: 10 minutes

1-2. a. Vibrator Pressure

Pressure to tight or to loose -5

Uneven pressure -7

Failure to lock settings -9

b. Plate Pressure

Pressure to tight or to loose -5

Uneven pressure -7

Failure to lock settings -9

3. Yes or No

4. Failed to use feeler strip to check pressure -5

Failed to report incorrect pressure -5

Did not know where adjustment is made -6

5. a. One error -6

Two errors -12

Three errors -18

b. Yes or No

c. Yes or No

400

PREPARE DAMPENING ASSEMBLY
DETAILED PROCEDURE SHEET #2
(HARRIS LIG PRESS)

1. INSTALLATION OF THE TOP FORM ROLLER

- a. Loosen lock screw
- b. Turn adjusting screw counter-clockwise to permit installation of roller
- c. Position roller on bearing, turn adjusting screw clockwise until the journal is inside the bearing.
- d. Secure lock screw

2. PARALLEL TOP FORM ROLLER TO PLATE

- a. Position assembly in #1 position
- b. Insert feeler strips in their appropriate position between the plate and top form roller
- c. Loosen locking knurl nuts
- d. Turn knurl adjusting nuts clockwise to decrease the pressure and counter clockwise to increase the pressure.
- e. Secure locking knurl nuts
- f. Do not remove feeler strip

3. ADJUST TOP FORM ROLLER TO VIBRATOR ROLLER

- a. Position assembly in #3 position
- b. Loosen lock screws
- c. Insert feeler strips in their appropriate position between the vibrator and top form roller
- d. Turn eccentrics in the direction of the arrow to increase pressure
- e. Secure locking screws
- f. Do not remove feeler strips

4. ADJUST TOP FORM ROLLER TO PLATE

- a. Position assembly in #1 position
- b. Recheck all adjustments
- c. Secure all adjustments
- d. Remove all feeler strips

5. REMOVE TOP FORM ROLLER

- a. Loosen lock screw
- b. Turn adjusting screw counter-clockwise to remove top form roller

Appendix 4 to
Student Practical Exercise

6. INSTALLATION OF THE BOTTOM FORM ROLLER
 - a. Position assembly in #3 position
 - b. Loosen lock screws
 - c. Turn adjusting screw counter clockwise to permit installation of roller
 - d. Position roller on bearing, turn adjusting screw clockwise until the journal is inside the bearing
 - e. Secure lock screws
7. PARALLEL BOTTOM FORM ROLLER TO PLATE
 - a. Position assembly in #1 position
 - b. Insert feeler strips in their appropriate position between the plate and bottom form roller
 - c. Loosen locking knurl nuts
 - d. Turn knurl adjusting nuts clockwise to decrease the pressure and counter-clockwise to increase the pressure
 - e. Secure locking knurl nuts
 - f. Do not remove feeler strips
8. ADJUST BOTTOM FORM ROLLER TO VIBRATOR ROLLER
 - a. Position assembly in #3 position
 - b. Insert feeler strips in their appropriate position between the vibrator and bottom form roller
 - c. Loosen lock screws
 - d. Turn eccentrics in the direction of the arrow to increase pressure
 - e. Secure locking screws
 - f. Do not remove feeler strips
9. ADJUST BOTTOM FORM ROLLER TO PLATE
 - a. Position assembly in #1 position
 - b. Recheck all adjustments
 - c. Secure all adjustments
 - d. Remove all feeler strips
 - e. Do not remove bottom form roller
10. REINSTALL THE TOP FORM ROLLER
 - a. Position assembly in #3 position
 - b. Repeat steps 1 a, b, c, and d
11. INSTALLATION OF THE FOUNTAIN ROLLER
 - a. Loosen thumbscrews
 - b. Place fountain roller in to its bracket, (ensure the roller gear meshes with the spiral gear on the drive mechanism)
 - c. Ensure the oil holes on the bushings are in the upward position
 - d. Secure thumbscrews

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12. INSTALLATION OF THE DUCTOR ROLLER

- a. Remove cotter pin
- b. Remove the top section of the bushing
- c. Place ductor roller in its brackets
- d. Replace top section of the bushing
- e. Replace cotter pin

13. ADJUST THE DUCTOR ROLLER TO THE FOUNTAIN ROLLER

- a. Engage ductor roller control knob
- b. Rotate press manually until the cam roller is on high point of the ductor cam
- c. Loosen lock knurl nuts
- d. Insert feeler strips in their appropriate position between the ductor and fountain roller
- e. Turn knurl adjusting screws clockwise to decrease pressure and counter clockwise to increase pressure
- f. Secure locking knurl nuts
- g. Remove feeler strips

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PREPARE DAMPENING ASSEMBLY

OUTLINE PROCEDURE SHEET #2

1. Installation of the top form roller.
2. Parallel top form roller to plate.
3. Adjust top form roller to vibrator roller.
4. Adjust top form roller to plate.
5. Remove top form roller.
6. Installation of the bottom form roller.
7. Parallel bottom form roller to plate.
8. Adjust bottom form roller to vibrator roller.
9. Adjust bottom form roller to plate.
10. Reinstall top form roller.
11. Installation of the fountain roller.
12. Installation of the ductor roller.
13. Adjust the ductor roller to the fountain roller.

Appendix 4A to
Student Practical Exercise

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300

POSTER NO.

GRADE	
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DAMPENING ASSEMBLY (LXG)

740-303-A-020-030

TOTAL	150
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Appendix 5 to SPI

(LXG)
PRACTICAL EXERCISE TEST
DAMPENING ASSEMBLY
INSTRUCTOR'S CUT SHEET

STUDENT TIME ALLOWED: 01:50 minutes

INSTRUCTOR TIME ALLOWED: 10 minutes

1-2. a. Vibrator pressure

Pressure too tight or too loose -5
Uneven pressure -7
Failure to lock settings -9

b. Plate Pressure

Pressure too tight or too loose -5
Uneven pressure -7
Failure to lock settings -9

3. Pressure to tight or to loose -5
Uneven pressure -7
Failure to lock settings -9

4. a. One error -6
Two errors -12
Three errors -18

b. Yes or No

c. Yes or No

SOURCE MATERIALS

LESSON: Prepare Dampening Assembly

LESSON OUTLINE DEVELOPMENT #1 (ATF-DP Offset Press)

1. Construction of the Dampening Assembly - TM 5-245, Offset Photolithography and Map Reproduction
 - a. Paragraph 8-18
 - b. Paragraph 8-18
 - c. Paragraph 8-18
 - d. Paragraph 8-18
 - e. Paragraph 8-18
2. Controls - TM 5-245
 - a. Paragraph 8-18, 8-19(a)
 - b. Paragraph 8-18, 8-19(b)
 - c. Paragraph 8-18, 8-19(c)
3. Adjusting the Dampening Assembly Rollers - TM 5-245
 - a. Paragraph 8-19(d)(1)(2)
 - b. Paragraph 8-19(d)(3)
 - c. Paragraph 8-19(d)(4)
4. Care and Cleaning of Rollers - TM 5-245
 - a. Paragraph 8-21(a)
 - b. Paragraph 8-21(b)

LESSON OUTLINE DEVELOPMENT #2

1. Construction of the Dampening Assembly - Harris Operating Manual
 - a. Paragraph 12
 - b. Paragraph 8-18 TM 5-245
 - c. Paragraph 8-18 TM 5-245
 - d. Paragraph 8-18 TM 5-245
 - e. Paragraph 8-18 TM 5-245
2. Controls - Harris Operating Manual
 - a. Paragraph 108
 - b. Paragraph 112
 - c. Paragraph 108

3. Adjusting the Dampening Assembly Rollers - Harris Operating Manual

- a. Paragraph 109
- b. Paragraph 110
- c. Paragraph 111

4. Care and Cleaning of Rollers - TM 5-245

- a. Paragraph 8-21 (a)
- b. Paragraph 8-21 (b)

SUPPLEMENT SOURCE MATERIAL #1

1. CONSTRUCTION OF THE ATF DP DAMPENING ASSEMBLY

The function of the dampening assembly is to supply a regulated amount of dampening solution to the non-printing areas of the plate. The assembly uses a water pan, and a series of rollers and levers, to accomplish this operation. Following is a breakdown of the component parts, their construction, and their function in the assembly.

a. Water pan. The first item to consider in the construction of the assembly is the fountain or water pan. This pan is the container or reservoir for the fountain solution. It is placed in the assembly in such a way as to make the solution available at all times. The pan is constructed of brass, stainless steel or chrome plated metal. It is slightly longer than the cylinders of the press, $5\frac{1}{2}$ inches wide, and one inch deep. It is readily accessible for cleaning while mounted on the press.

b. Fountain roller. The fountain roller revolves directly above the water pan and is submerged $1/8$ to $1/4$ of an inch into the solution. It is constructed of the same type of metals as the water pan. This roller is not easily corroded by the fountain solution and will pick up and hold the solution on its surface. The roller is gear driven at a speed considerably slower than the other rollers of the press.

c. Ductor roller. The ductor roller picks up the solution from the fountain roller and conveys it to the vibrator. This is accomplished by the peculiar motion not only of revolving in the usual manner, but moving back and forth in an arc between the fountain roller and the next roller in the system. Thus, for part of a press revolution, it is in contact with the fountain roller, collecting dampening solution, and during the rest of the revolution, it is in contact with and delivering solution to the vibrator roller.

The ductor roller is constructed of a steel core, a heavy layer of rubber, and a layer of flannel-like fabric known as molleton.

The ductor roller is friction driven and assumes the speed of the roller it is in contact with. Thus, it moves slowly when in contact with the fountain roller, and rapidly when in contact with the vibrator roller. Because of shorter spindles, the ductor roller is shorter than the other covered rollers in the assembly, but its covered surface is the same length.

Appendix #1 to
Source Material

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d. Vibrator roller. The third roller in the assembly is the vibrator roller. This roller picks up the fountain solution from the ductor roller and distributes it evenly to the form rollers. To do this, it performs an oscillating motion as it turns; that is to say, it moves $5/8$ of an inch from side to side, on its own axis.

The vibrator roller is constructed of the same types of metal as the fountain roller, but unlike the fountain roller cannot be removed from the press. The entire dampening assembly is built around the vibrator roller, and only a press erector or a senior pressman will remove it. This roller cannot be adjusted, and acts as a starting point for other roller adjustments. For this reason it is sometimes called the "base" roller.

As was the case with the fountain roller, the vibrator is gear driven. It is so geared that the form rollers, which the vibrator drives by friction, are traveling at the proper speed to roll smoothly on the revolving plate cylinder. The vibrator is the main drive for the dampening system.

e. Form rollers. The two form rollers transfer the dampening solution from the vibrator to the plate. They are constructed of the same materials as the ductor roller: steel core, and a layer of molleton. The fabric cover holds a reserve of solution so that it is distributed evenly to the plate, and their relatively soft surfaces minimize damage to the plate.

As previously mentioned, the form rollers are friction driven by the vibrator. This eliminates drag on the plate which would shorten the life of the image. The form rollers are interchangeable, prior to their being adjusted.

2. CONTROLS

a. Water motion throw-off handle and latch. In order to control the dampening assembly and, therefore, the amount of solution that reaches the plate, there are three separate controls. The main control for the assembly is the handle and latch mechanism which moves the whole assembly to or from the plate. This is the water motion throw-off handle and latch.

In position Number 1, the dampening assembly is engaged, with the form rollers against the plate. This is the operating position which is used any time the ink rollers are against the plate, as when printing. This position is identified by the handle being in the top slot of the latch.

In position Number 2, the assembly is engaged (gears are meshing), but the form rollers do not touch the plate. This position is used when wetting the assembly, idling with gum on the

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plate, and at various other times when the ink rollers are not in contact with the plate. This position is identified by the handle being in the bottom slot of the latch.

In position Number 3, the entire assembly is racked back as far as it will go, thus disengaging the gears completely. This position is used when the dampening assembly is not being used, such as when the press is being cleaned or adjusted.

b. Water-on lever. In order to control the solution transfer from the fountain roller to the other rollers in the assembly, the ductor roller motion is controlled in two ways. One of these controls is the water-on lever. This lever, located just below the side guide mechanism and directly above the feeder valve, on the operator's side, controls the movement of the ductor roller.

When the lever is in its "on" position (down), the ductor roller will move back and forth in an arc between the vibrator and the fountain roller, receiving and delivering solution while the press is running.

When the lever is in the "off" position (up), the ductor roller ceases its arcing motion and simply rolls in contact with the vibrator roller, and therefore does not receive or deliver any additional solution.

It is evident why such a control is necessary. When the press is idling the fabric rollers are sufficiently damp, no more solution need be delivered. While the press is printing the ductor roller must deliver solution to the form to replenish that lost by evaporation, or by transfer to the plate and to the stock.

However, when the press is not printing, no solution is being used, and the solution flow must be stopped or an excess will be built up in the dampener rollers.

c. Water motion control unit. The second control for the ductor is the water motion control unit, which governs the length of time the ductor roller remains in contact with the fountain roller. This control is located on the flywheel side of the press just below the dampening assembly drive gears.

By means of an adjustable cam, this device controls the period that the ductor contacts the fountain roller, and therefore the amount of solution received by the form rollers. The cam which activates the ductor roller's arcing motion, can be raised or lowered by means of this control. Raising this cam causes the ductor roller to remain (dwell) against the fountain roller for a longer period of time, thus receiving and delivering more solution. Lowering the cam decreases the dwell and thus decreases the amount of solution.

On the DP Model, the control is a bar, a short metal arm, a star-shaped locking wheel, and a knurled thumb screw. Loosening the locking wheel and turning the knurled knob moves the bar along an arc. Investigation will show that moving the bar up causes the cam to drop down, thus decreasing the dwell and the amount of solution. Moving the bar down causes the cam to raise, increasing the dwell and the amount of solution.

3. ADJUSTING THE DAMPENING ASSEMBLY

For the dampening assembly to do its necessary job, each component must be correctly adjusted. Fabric covered rollers cannot hold constant diameters because of shrinkage and wear of the fabric, therefore, they must be constantly adjusted to give the best possible transfer of solution from one roller to another. An incorrectly set assembly can cause many troubles during a press run. Dry streaks resulting in scum, and wet streaks resulting in loss of color are two of the many possible troubles. As was mentioned previously, the only roller in the dampening assembly that is not adjustable is the vibrator roller. This roller is permanently set in the unit and as such is always parallel to the plate cylinder. For this reason, it is often called the base roller. All of the other rollers are set to or from the vibrator roller, directly or indirectly.

To check the pressure of one roller's setting to another, strips of paper or acetate, .003 - .004 inch thick, are used as feeler gauges. The strips are placed between the rollers to be adjusted and then withdrawn. The pressure or "drag" on the strips is indicative of the pressure between the rollers. The rollers are adjusted to get a light, even tension on the strips, when they are pulled. It is very important that the tension be equal on both ends of the rollers and that low or high spots be compensated for.

The adjustment of the amount of fountain solution is a delicate one. A slight change in the position of the cam will cause a considerable change in the amount of solution reaching the plate. Normally, press operation is started with the cam in a central position; however atmospheric conditions, type of ink, size and type of image, and other factors may dictate, that several settings may be made before final setting.

4. THE CARE AND CLEANING OF ROLLERS

a. Metal rollers. Many troubles in printing with the lithographic press arise from dirty rollers in the dampening assembly. When the metal rollers in the assembly become coated with ink, they are unable to carry the dampening fluid properly. This often causes dry streaks on the plate, resulting in scumming. Oxidation of the metal surfaces can also prevent the rollers from carrying the fountain solution properly.

To clean metal rollers that have picked up ink on their surfaces, the fabric covered rollers are removed from the assembly, the ink is removed with an ink solvent and the metal surfaces scrubbed thoroughly with a mixture of plate etch and pumice powder to increase their affinity for the fountain solution. To clean rollers that have oxidized, rubbing with pumice powder will take care of even the most serious oxidation. Alternately, a good grade of metal polish, followed by washing with plate etch, will do the job equally well.

Once the metal rollers have been cleaned, it is good practice to apply a thin coat of gum arabic. This coating serves to prevent oxidation. At least one cleaning and one coating of gum arabic per day should be standard procedure with operating the press.

b. Fabric covered rollers. Just as dirty metal rollers will not carry the fountain solution properly, the fabric covered rollers also will not carry solution when the fabric is saturated with ink or grease. This condition is more serious with the fabric covered rollers than with the metal rollers because the ink not only prevents the transfer of the dampening fluid, but also tends to redeposit ink on the plate. The tendency to scum is therefore much greater if the rollers are dirty.

The fabric covered rollers may be cleaned in several ways, the most common being with a stiff-bristled brush and plain water. If the rollers are extremely dirty, soap or one of several commercial cleaning preparations may be used. Care should be taken to rinse the rollers thoroughly. Occasionally an ink solvent may be employed to help remove the ink, again rinse thoroughly to remove all traces of the solvent. Following any scrubbing, the rollers must be scraped with the edge of an ink knife to remove any excess water and loosened dirt.

The rollers are placed in a rack parallel to the floor and allowed to dry before re-use. Particular care must be taken that the fabric surfaces are not allowed to come into contact with objects which could cause depressions or flat spots.

SUPPLEMENT SOURCE MATERIAL #2

1. CONSTRUCTION OF THE HARRIS LIG DAMPENING ASSEMBLY

The function of the dampening assembly is to supply a regulated amount of dampening solution to the non-printing areas of the plate. The assembly uses a water pan, and a series of rollers and levers, to accomplish this operation. Following is a breakdown of the component parts, their construction, and what each of them do in the assembly.

a. Water pan. The first item is the fountain, or water pan. This pan is the container or reservoir for the fountain solution. It is placed in the assembly in such a way so as to make the solution available at all times. It is $33\frac{1}{2}$ inches long, $5\frac{1}{2}$ inches wide, and 1 inch deep. It is moulded from plastic and can be removed for cleaning.

b. Fountain roller. The fountain roller revolves directly above the water pan submerged $\frac{1}{4}$ to $\frac{1}{8}$ of an inch into the solution. It is constructed of brass, and is covered with a linen sleeve which is pulled tight and tied down on both ends. This enables the roller to pick up and hold the fountain solution on its surface. The fountain roller is gear driven at a speed considerably slower than the other rollers of the press.

c. Ductor roller. The ductor roller picks up the solution from the fountain roller and conveys it to the vibrator. This is accomplished by the peculiar motion of not only revolving in the usual manner, but moving back and forth in an arc between the fountain roller and the next roller of the system. For part of a press revolution, it is in contact with the fountain roller, collecting dampening solution, and during the rest of the revolution, it is in contact with, and delivering solution to, the vibrator roller.

The ductor roller is constructed of metal core with a rubber body, and is covered with a turkish towel like material called molleton.

The ductor roller is friction driven and assumes the speed of the roller it contacts. It moves slowly when in contact with the fountain roller, and rapidly when in contact with the vibrator roller.

Appendix #2 to
Source Material

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d. Vibrator roller. The third roller in the assembly is the vibrator roller. This roller picks up the solution from the ductor roller and distributes it evenly to the form rollers. To do this it performs an oscillating motion as it turns; that is to say it moves from side to side on its own axis. It is constructed of stainless steel and unlike the fountain roller, cannot be removed from the press. The entire dampening assembly is built around the vibrator roller, and only a press erector or a senior pressman will remove it. This roller cannot be adjusted; thereby acting as a starting point for other roller adjustments. For this reason, it is sometimes called the base roller.

As was the case with the fountain roller, the vibrator is gear driven. It is so geared that the form rollers, which the vibrator drives by friction, are traveling at the proper speed to roll smoothly on the revolving plate cylinder. The vibrator is the main drive for the dampening system.

e. Form rollers. The two form rollers transfer the dampening solution from the vibrator to the plate. They are constructed of the same materials as the ductor roller: steel core, rubber body, and an outer layer of molleton.

As was previously mentioned, the form rollers are friction driven by the vibrator. This eliminates drag on the plate which would shorten the life of the image. The form rollers are interchangeable prior to adjustment.

2. CONTROLS

a. Operating handle. The main control for the assembly is the operating handle which moves the assembly in and out of contact with the plate.

(1) Run position number 1. In this position the gears are meshed, the form rollers are in contact with the plate, and all parts of the assembly are engaged. This is the printing position and identified by the outside detent pin being in the notch of the handle.

(2) Idle position number 2. In this position the gears are meshed and the dampening assembly is engaged. However, the form rollers are not in contact with the plate. This position is used for wetting the assembly, idling the press with gum on the plate and other times when the form rollers need not come in contact with the plate. In this position the inside detent pin is in the notch of the handle.

(3) Wash-up position number 3. In this position the dampening assembly is rolled away from the plate as far as possible. The gears are not meshed and the form rollers are not in contact with the plate. This position is used when the dampening assembly is not in operation and when the press is being cleaned or adjusted.

b. Two cam setting. These two cams are located directly under the water pan, one on the operator's side and the other on the flywheel side of the press. The cam on the operator's side controls the length of time the ductor roller is in contact with the pan roller. The cam on the flywheel side controls the length of time the ductor roller is in contact with the vibrator roller.

c. Ductor roller control. The ductor roller is controlled by a knob. When the knob is pushed in ("on" position) the ductor roller is engaged and will move back and forth in an arc motion between the vibrator and a fountain roller, receiving and delivering solution while the press is in operation.

When the knob is pulled out ("off" position) the ductor roller is disengaged and ceases its arcing motion, it simply rolls in contact with the vibrator roller neither delivering or receiving any additional solution through the system.

3. ADJUSTING THE DAMPENING ASSEMBLY (HARRIS LKG)

For the dampening assembly to do its necessary job, each component must be correctly adjusted. Fabric covered rollers cannot hold constant diameters because of shrinkage and wear of the fabric, therefore, they have to be constantly checked and adjusted to give the best possible transfer of the fountain solution from one roller to another. An incorrectly set assembly can cause many troubles during a press run, dry streaks and the loss of color are just two of the many possible troubles. To check the pressure of one roller setting to another, strips of paper or acetate .003 to .004 inch thick are used as feeler gauges. The strips (feeler gauges) are placed between the rollers to be adjusted approximately two inches from each end of the rollers. The pressure or "drag" on the strips is indicative of the pressure between the rollers. The rollers are adjusted to get a light, even identical pull on both feeler strips. It is very important that the tension be equal on both ends of the rollers, and that the low and high spots are compensated for. Once the tension is obtained the adjustment is secured and the feeler strips are removed. Prior to adjusting the form roller install the plate and pack to bearer height. Wash the vibrating roller thoroughly with solvent and after cleaning, cover with a light coating of etch.

4. THE CARE AND CLEANING OF ROLLERS

a. Metal rollers. Many troubles in printing with the lithographic press arise from dirty rollers in the dampening assembly. When the metal rollers in the assembly become coated with ink, they are unable to carry the dampening fluid properly. This often causes dry streaks on the plate, resulting in scumming. Oxidation of the metal surfaces can also prevent the rollers from carrying the fountain solution properly.

To clean metal rollers that have picked up ink on their surfaces, the fabric covered rollers are removed from the assembly, the ink is removed with an ink solvent and the metal surfaces scrubbed thoroughly with a mixture of plate etch and pumice powder to increase their affinity for the fountain solution. To clean rollers that have oxidized, rubbing with pumice powder will take care of even the most serious oxidation. Alternately, a good grade of metal polish, followed by washing with plate etch, will do the job equally well.

Once the metal rollers have been cleaned, it is good practice to apply a thin coat of gum arabic. This coating serves to prevent oxidation. At least one cleaning and one coating of gum arabic per day should be standard procedure with operating the press.

b. Fabric covered rollers. Just as dirty metal rollers will not carry the fountain solution properly, the fabric covered rollers also will not carry solution when the fabric is saturated with ink or grease. This condition is more serious with the fabric covered rollers than with the metal rollers because the ink not only prevents the transfer of the dampening fluid, but also tends to redeposit ink on the plate. The tendency to scum is therefore much greater if the rollers are dirty.

The fabric covered rollers may be cleaned in several ways, the most common being with a stiff-bristled brush and plain water. If the rollers are extremely dirty, soap or one of several commercial cleaning preparations may be used. Care should be taken to rinse the rollers thoroughly. Occasionally an ink solvent may be employed to help remove the ink, again rinse thoroughly to remove all traces of the solvent. Following any scrubbing, the rollers must be scraped with the edge of an ink knife to remove any excess water and loosened dirt.

The rollers are placed in a rack parallel to the floor and allowed to dry before re-use. Particular care must be taken that the fabric surfaces are not allowed to come into contact with objects which could cause depressions or flat spots.

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potential Hydrogen
Programmed Instruction
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OBJECTIVE OF THIS LESSON

Upon successful completion of this lesson, you should be able to:

1. Describe the pH scale and its purpose.
2. Explain the process used to test for acid using litmus paper.
3. Explain the effects of too little or too much acid.
4. Give the formula used to mix fountain solution.

402

pH SCALE

Instruction Sheet

This programmed lesson divides the lesson information into small "frames" which are followed by an incomplete "response" or "action". Study each frame until you can complete the missing portion of the response or action, then check (do not merely copy) your answer with the correct answer which is printed on the next page. If your answer does not agree, re-study the frame, or if you need assistance, raise your hand and an instructor will aid you.

Note that the illustrations which appear in this lesson are not complete, but portray or emphasize only the data discussed in the frame.

This booklet is your property; make notes in it where you think they are needed. Your answers are for your information and are not a test other than proving to yourself whether or not you understand the "response" or "action".

Begin your work with frame 1 on page 1 at the top of the page and continue along the top of each page until directed to return to page 1. Then begin with the next sequenced frame and continue through the book until directed to return to page 1 or do the self test. This self test is designed so that you may check your understanding of the entire lesson.

420

FRAME #1

pH is the symbol for potential Hydrogen. Potential Hydrogen is known by the symbol _____.

FRAME #11

Distilled or chemically pure water has a pH reading of 7. A pH reading of distilled or chemically pure water will be _____.

FRAME #27

The fountain solution must have a certain amount of acid but then too much acid tends to weaken the image. The image is weakened by the use of too much _____ in the fountain solution.

404

pH

7

acid

422

FRAME #2

As an offset pressman it is important to know what the pH (potential hydrogen) of your dampening fountain solution is and this pH is determined by the use of a 14 step scale which determines the acidity or alkalinity of the fountain solution.

FRAME #15

Many variables effect the pH of the fountain solution. Some of these include metal rollers, paper and ink. The pH of the fountain solution is effected by metal rollers, _____ and _____.

FRAME #28

Background tinting occurs when there is too much acid in the fountain solution. This will cause an overall sensitizing of the plate. An overall sensitizing of the plate will cause _____.

406

No response

paper, ink

background tinting

424

4

FRAME #3

The pH scale has a reading from 0 to 14 with the number 7 on the scale being neutral. Number 7 represents the neutral position on the pH scale and this scale is numbered from _____.

FRAME #16

A pH reading of 4.6 represents a proper fountain solution for aluminum plates. When mixing a fountain solution, the pH should be 4.6 for _____ plates.

FRAME #29

Scumming of the plate and emulsification of the ink are caused by too little acid in the fountain solution. Too little acid content results in _____ of the plate and _____ of the ink.

408

0-14 If your answer was different than this study the scale of Frame #2 again.

aluminum

scumming, emulsification

426

FRAME #4

Any reading below 7 on the pH scale shows the acid contents of the fountain solution. The acid content is shown on the pH scale as a number below _____.

FRAME #17

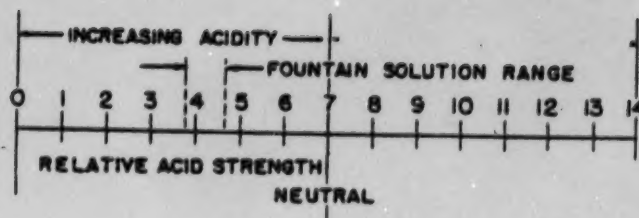
In order to insure a proper fountain solution for aluminum plates, the acid content of the solution should read _____.

FRAME #30

Too much acid tends to _____ the image and leads to _____, while too little acid causes _____ of the plate and _____ of the ink.

410

7



4.6

weaken, background tinting, scumming, emulsification

428

8

411

FRAME #5

The alkaline in the fountain solution is shown on the scale as a number above 7. A reading above 7 will show _____ on the pH scale.

FRAME #18

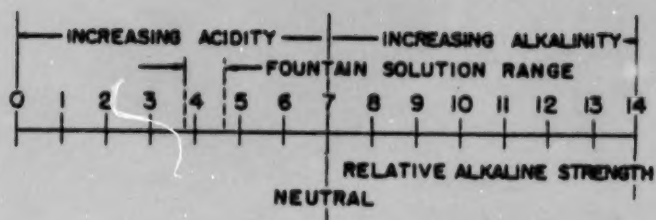
Since we know that many variables produce different pH values of fountain solution, we must first start with a basic solution. This formula is: 1 oz gum arabic and 1 oz plate etch to one gallon of water.

FRAME #31

To insure the pH factor remains at 4.6, we must test for acid in the fountain solution. By testing we can assure that the solution will remain at _____.

4/2

alkaline



No response

4.6

430

FRAME #6

7 being neutral on the pH scale means that the solution being used in the dampening system is neither acid nor alkaline. A solution that is neither acid nor alkaline is said to be _____.

FRAME #19

In mixing a fountain solution, we use 1 oz gum arabic and 1 oz plate etch to one gallon of _____.

FRAME #32

There are two methods of determining pH values, electrometric and colorimetric. Both are used in offset printing but the latter is used more extensively, therefore, it is the only method we will discuss.

414

neutral

water

No response

432

12

415

FRAME #7

The closer the number is to zero the higher the acid content of the solution. Zero represents the highest _____ content in the solution.

FRAME #20

To mix a fountain solution, we need 1 oz gum arabic, 1 oz _____ to one gallon of water.

FRAME #33

The colorimetric system consists of two methods, litmus paper and an instrument called a pocket comparator. The pocket comparator and litmus paper are the two methods used to test pH value using the _____ system.

416

acid

plate etch

colorimetric

434

14

FRAME #8

Acid is represented on the pH scale in the range of 0 to 7, the smaller the number is the more acid content will be in the fountain solution. Acid content which reads 3.5 is _____
than a 5.3 reading. higher - lower

FRAME #21

Once the fountain solution has been mixed, we test it to find the pH. If the acidity is too high, ammonium hydroxide or water is added. To lower the acidity of the fountain solution, _____, _____
_____, or _____ is added.

FRAME #34

The simplest method of testing the acid content is by the use of litmus paper. The paper used to test acid content is called _____ paper.

418

higher

If your answer was different than this, reread Frames
6 and 7.

ammonium hydroxide, water

litmus

436

FRAME #9

We now know that the closer the reading of the fountain solution is to zero, the higher the acid content is. With alkaline, the closer the number to 14, the higher the _____ content.

FRAME #22

Phosphoric acid or plate etch is used to raise the acidity of the fountain solution. To raise the acidity of the fountain solution, add _____ or _____.

FRAME #35

Litmus paper is a strip of paper which changes its color when immersed in the solution to be tested. When immersed in the solution to be tested, litmus paper changes _____.

420

alkaline

phosphoric acid, plate etch

color

438

FRAME #10

On the pH scale, 7 represents _____, zero "0" represents
the _____ acidity reading and 14 represents
the _____ higher - lower
the _____ alkalinity reading on the scale.
the _____ higher - lower

FRAME #23

If the acidity of the fountain solution is too high, _____
_____ or water is added. To raise the acidity, _____
_____ or plate etch is used.

FRAME #36

The new color of the litmus paper is checked against a standard color
chart.* A standard color chart is used to compare the color of the
_____ paper.

*Note: Each brand of litmus paper has its own standard color chart.

422

neutral, highest, highest

ammonium hydroxide, phosphoric acid

litmus

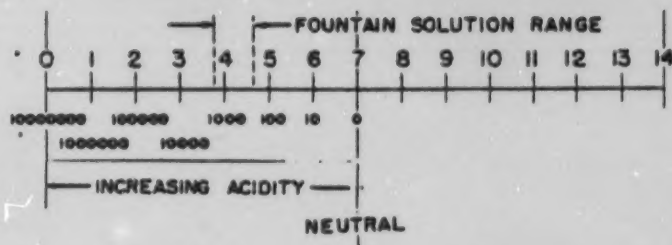
440

FRAME #11

pH values are very important in the make-up of the fountain solution. The fountain solution is a slightly acid liquid which is used to dampen the nonprinting areas of the plate so that these areas will repel the greasy ink when the plate is inked.

FRAME #24

It is important to understand that when raising or lowering the pH factor, each full step (example: a reading of 5 to a reading of 6) will change the pH value ten times. When the pH factor is raised or lowered one full step, the factor will change _____ times.



FRAME #37

The pH reading is then taken from the standard color chart. This method is not as accurate as the pocket comparator but gives an approximate _____ reading for the pressman.

424

No response



10 times



pH

412

FRAME #12

Usually plain water tends to be slightly alkali, therefore, it will not repel ink from the nonprinting areas of the plate. Due to the alkali content plain _____ will not work adequately to repel ink from the nonprinting areas of the plate.

FRAME #25

While printing, a chemical action caused by the acid (plate etch) in the fountain solution is necessary to keep the plate clean. However, this action must be very slow. In order to keep the plate clean while printing, it is necessary to have a chemical action caused by the _____ (plate etch) in the fountain solution.

FRAME #38

The use of _____ paper is the simplest method to test for acid.

426

water

acid

litmus

411

24

FRAME #13

Water from different sources will have varied pH readings. To overcome this problem, distilled water can be used which will give a constant reading. To get a constant pH reading _____ can be used.

FRAME #26

In addition to the application of plate etch, a thin film of gum arabic is also being deposited on the plate. This gum arabic helps hold moisture on the nonprinting areas of the plate. Moisture is held to the nonprinting areas of the plate by _____.

FRAME #39

The most reliable and simplest instrument to test pH is the pocket comparator. It will not be discussed in this text but for further information, detailed instructions can be found with each kit.

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distilled water

RETURN TO PAGE 1

gum arabic

RETURN TO PAGE 1

No response

TURN TO THE SELF-TEST PAGE 27

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26

SELF-TEST

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2. What causes scumming of the plate?	5
3. What are the two methods of testing pH using the colorimetric system?	13
4. What should the pH value be for aluminum plates?	5
5. What is the neutral point of pH?	5
6. What is the simplest method to test pH?	15
7. What will a pH reading of 8.7 show? (acid or alkaline)?	9
8. What is the proper formula for fountain solution?	9
9. How do we ensure that the pH value remains constant?	9
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430

LESSON PLAN

PREPARE INKING ASSEMBLY

740-303-A-020-040

OFFSET PRINTING



DEFENSE MAPPING SCHOOL — FORT BELVOIR, VIRGINIA

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LESSON REQUIREMENTS SHEET

COURSE: Offset Printing

LESSON: Prepare Inking Assembly

OBJECTIVE: Provided with a small or medium size offset press with appropriate operators manual, press tools, feeler strips and a list of safety rules, the student will install and adjust all necessary ink rollers in proper sequence. Explain and identify all inking controls. The student will be given a 2 hour examination on his ability to fulfill all procedures outlined in his Operator's Manual, he must achieve a minimum grade of 70 to successfully complete this lesson.

TIME: 24 Hours: 4D, 18PE, 2E.

TRAINING AIDS AND DEVICES:

A-109-57 Schematic Drawing of a Typical Offset Press.

STUDENT MATERIALS AND EQUIPMENT:

1. Small or medium Offset Press - 1 per designated group
2. Feeler Strips - as required
3. Wiping Rags - as required
4. Press Tool Kit - 1 per press

SPECIAL REQUIREMENTS:

1. Training Area:
 - a. 30-man classroom equipped with desks, chairs and chalkboard.
 - b. Pressroom equipped with 1 offset press and workbench with tool kit for each designated group.
2. Assistant Instructors: 1 assistant instructor per designated group.

TEXT REFERENCES:

1. Instructor: TM 5-245 (7-70) Offset Photolithography and Map Reproduction, Chapter 8, Section VII, para 8-21 thru 8-24.

Harris Operator's Manual, Section III para 23, Section IX para 84-93, Section X para 94-97.

L-129BC Operator's Manual, Sections VIII and IX.

The Lithographer's Manual 1970.
2. Student: Operator's manual appropriate to their assigned press.

LESSON OUTLINE

LESSON: Prepare Inking Assembly

SUBJECT MATTER OUTLINE	INSTRUCTIONAL TACTICS
<u>INTRODUCTION</u> During the last lesson, Prepare Dampening Assembly, you were instructed on how to properly install and adjust the Dampening Assembly, including the adjustment and operation of the controls. During this block of instruction, Prepare Inking Assembly, we will cover the correct sequence to follow during the installation and adjustment of all necessary ink rollers and the appropriate controls.	Use Schematic Drawing #A-109-57 of an offset press to point out the Inking System of an offset press. NOTE TO THE INSTRUCTOR: Due to the teaching of three different Inking Assemblies, this lesson has been divided into three Developments: Development 1. ATF DP " 2. Harris LXG " 3. Harris L-129BC Students will be assigned to specific groups for the demonstration by the Assistant Instructors. The Assistant Instructors will distribute the appropriate Procedure Sheets to their students prior to the demonstration.
<u>DEVELOPMENT 1</u> ATF-DP Offset Press 1. PERFORM SAFETY CHECK 2. INK FOUNTAIN ASSEMBLY a. Ink fountain b. Fountain roller c. Manual handle d. Fountain blade e. Abutment plate rod assembly f. Fountain keys	Point out location, explain and demonstrate function. Check student understanding by asking questions.

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SUBJECT MATTER OUTLINE	INSTRUCTIONAL TACTICS
3. AUTOMATIC INK CONTROL UNIT a. Ink control handle b. Ink control pawl c. Ink control ratchet d. Ink control lever e. Ink motion throw-off handle	Explain and demonstrate operational function. Ask questions to check student understanding.
4. METHOD OF SETTING INK ROLLERS a. Accuracy b. Feeler strips c. Adjustment to vibrator roller d. Adjustment to plate	Point out and explain the prescribed method of setting rollers. Check student understanding by asking questions.
	BREAK AT INSTRUCTOR'S DISCRETION
5. INK ROLLERS a. Form rollers (1) #2 (2) #1 (3) #3 b. Vibrator c. Intermediate rollers d. Rider roller e. Ductor roller	Explain the operational function and refer to Appendix 2 to Student Practical Exercise Sheet for detailed instructions. Stress safety. Ask questions to check student understanding.
	BREAK AT INSTRUCTOR'S DISCRETION
<u>DEVELOPMENT #2</u> Harris LXG Offset Press 1. PERFORM SAFETY CHECK 2. INK FOUNTAIN ASSEMBLY a. Ink fountain b. Fountain roller	Point out location, explain and demonstrate function.

SUBJECT MATTER OUTLINE	INSTRUCTIONAL TACTICS
c. Manual handle d. Fountain blade e. Fountain keys 3. AUTOMATIC INK CONTROL UNIT a. Ink control handle b. Ink control pawl c. Ink control ratchet d. Ductor roller control (1) For continuous operation (2) For automatic operation (3) To stop the ductor from operation e. Ink motion throw-off handle 4. METHOD OF SETTING INK ROLLERS a. Accuracy b. Ink beads c. Adjustment to vibrator roller d. Adjustment to plate	Check student understanding by asking questions. Explain and demonstrate operational control. Ask questions to check student understanding. Point out and explain the prescribed method. Check student understanding by asking questions.
	BREAK AT INSTRUCTOR'S DISCRETION
5. INK ROLLERS a. Form rollers (1) #2 (2) #3 (3) #1 (4) #4 b. Center rider roller c. Intermediate rollers d. Vibrator roller	Explain and demonstrate the proper sequence. Refer to Appendix 4 to Student Practical Exercise sheet for detailed instructions. NOTE: Students on presses 7 and 8 will explain why there is no #1 form roller. (Metering system.)

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SUBJECT MATTER OUTLINE	INSTRUCTIONAL TACTICS
e. Distributor rollers f. Rider rollers g. Ductor roller (QUESTIONS AND COMMENTS PERIOD)	Stress safety. Check student understanding by asking questions.
<u>DEVELOPMENT #3</u> Harris L-129-BC Offset Press 1. PERFORM SAFETY CHECK 2. INK FOUNTAIN ASSEMBLY a. Ink fountain b. Fountain roller c. Manual handle d. Fountain blade e. Fountain keys 3. AUTOMATIC INK CONTROL UNIT a. Ink feed control knob b. Ductor roller control (1) For continuous operation (2) For automatic operation (3) To stop the ductor from operation c. Form roller control (1) "On" position (2) "Auto" position (3) "Off" position MANUAL FORM ROLL CONTROL 4. METHOD OF SETTING INK ROLLERS a. Accuracy	Point out location, explain and demonstrate function. Check student understanding by asking questions. Explain and demonstrate operational control. Explain and demonstrate. Explain and demonstrate how to use form roll link. Throw off to enable manual form roll control to work properly.

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SUBJECT MATTER OUTLINE	INSTRUCTIONAL TACTICS
b. Adjustment to the vibrator c. Adjustment to the plate d. Feeler strips e. Ink form rollers (1) #2 form roller (2) #3 form roller (3) #4 form roller (4) #5 form roller f. Bridge roller g. Distributor rollers h. Friction roller i. Ductor roller j. Lower storage roller k. Upper storage roller l. Vibrator rider roller	Point out and explain the prescribed method. Check student understanding by asking questions. Explain and demonstrate the proper sequence.
<u>APPLICATION</u>	Students are to perform SPE after demonstration. Allow each student to go through SPE as many times as time permits.
	BREAK AT INSTRUCTOR'S DISCRETION
<u>EXAMINATION</u>	Students are to perform examinations 1, 2 and 3 (allow 1 hour and 45 minutes for exam and 15 minutes for critique. Grading for this exam is by Assistant Instructor assigned to press).
<u>SUMMARY</u> During the last 24 hours of instructions you installed and adjusted the ink rollers in their proper sequence. You also familiarized yourself with the operation of the various inking controls.	

SUBJECT MATTER OUTLINE

INSTRUCTIONAL TACTICS

Remember well what you have learned because proper setting of the ink rollers will become more important as you progress through this course.

In future lessons you will have a chance to see how the ink and water balance will effect the over-all quality of the printed sheet.

Your next lesson, PREPARE PRESS FOR OPERATION, will include the combination of all major assemblies plus the make ready and wash-up procedures.

740-303-A-020-040
 Demonstration A-1, B-1, C-1

DEMONSTRATION

LESSON: Prepare Inking Assembly

OBJECTIVE: To demonstrate to the student the proper procedures to install and adjust, in sequence, all adjustable ink rollers, then insert the remaining ink rollers in proper sequence. The student will be able to explain and position all inking controls of either the ATF-DP, LXG or L-129-BC offset press.

SUPPORT REQUIREMENTS:

1. Small or medium size offset press - 1 per designated group
2. TM 5-245 and appropriate operator's manual - 1 per student
3. 1 Assistant Instructor per press
4. Press tool kit - 1 per press
5. Feeler strips .003 to .004 thick - as required
6. Time required - 4 hours

SUBJECT MATTER OUTLINE	INSTRUCTIONAL TACTICS
This demonstration will provide the student with sufficient knowledge to prepare the inking assembly of a small or medium size offset press. <u>DEVELOPMENT</u>	Instructor will have students position themselves around the demonstration press so that they will be able to observe all procedures. The development for this demonstration is also the student practical exercise (see A-1, B-1, or C-1) and will be covered completely. (Use detailed procedure sheet for this demonstration). The instructor will cover each step in a narrative manner while the assistant instructor demonstrates the steps. The instructor will read each caution note before the assistant instructor demonstrates that step. After each major step the instructor will check student understanding before proceeding to the next step. 12/77

STUDENT PRACTICAL EXERCISE

LESSON: Prepare Inking Assembly

OBJECTIVE: During this exercise, the student will perform operator's safety check of the press, operate all controls for the inking assembly and know their function. Install and adjust all adjustable ink rollers and install all non-adjustable ink rollers in a small or medium size offset press.

STUDENT MATERIALS AND EQUIPMENT:

1. Feeler strips .003 to .004 thick - as required.
2. Press tool kit - 1 per press
3. Procedure sheets - 1 per student
4. A small or medium size offset press - 1 per designated group

SPECIAL REQUIREMENTS:

1. One assistant instructor per 2 designated groups during this practical exercise.
2. Time required: 4 hours per student and repeated for a total of 10 hours.

STUDENT REQUIREMENTS: Utilizing detailed and outline procedure sheets, either A-1, B-1 or C-1, the student will:

1. Make a safety check prior to operating the press and adhere to all safety regulations throughout this exercise.
2. In the correct sequence, install and adjust all adjustable rollers using feeler strips or ink beads to obtain the desired tension, according to specifications.
3. Complete the installation of all non-adjustable rollers, in the correct sequence, according to instructions.
4. Parallel the ductor roller using feeler strips, or ink beads.
5. Explain the adjustment of the fountain roller assembly.
6. Explain and demonstrate the operational function of various controls of the inking assembly.

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D-1

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740-303-A-020-040

PREPARE INKING ASSEMBLY
DETAILED PROCEDURE SHEET #1
(ATF-DP)

1. PERFORM SAFETY CHECK

2. INK FOUNTAIN ASSEMBLY

Point-out, explain and demonstrate function of:

- a. Fountain Roller
- b. Manual Handle
- c. Abutment Plate Rod
- d. Fountain Blade
- e. Fountain Keys

3. AUTOMATIC INK CONTROL UNIT

Point-out, explain and demonstrate function of:

- a. Ink Control Handle
- b. Ink Control Pawl
- c. Ink Control Ratchet
- d. Ink Control Lever
- e. Ink Motion Throw-off Handle

4. METHOD OF SETTING INK ROLLERS

Display strips, tools and explain the prescribed method of setting rollers with the use of paper strips.

- a. Accuracy on "drag" while using feeler strips
- b. Adjustment to vibrator roller
- c. Adjustment to plate

5. INSTALLATION OF #2 FORM ROLLER (J)

- a. Place a bearing on each end of the #2 Form Roller.
- NOTE: Ensure that oil holes are in the upward position.
- b. Seat the #2 Form Roller into it's brackets.
 - c. Put a roller sleeve on the end of the copper vibrator roller shaft.
 - d. Position the vibrator roller into the press.
 - e. Align the fiber block of the vibrator roller mechanism into it's correct position and seat the copper vibrator roller.
 - f. Rotate the vibrator roller sleeves into their locked position.

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E-1

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6. ADJUSTING #2 FORM ROLLER TO VIBRATOR ROLLER AND PLATE

- a. Insert first set of feeler strips between the vibrator and form roller.
- b. Insert a second set of feeler strips between the form roller and plate.

NOTE: All feeler slips should be located 2" in from ends of form roller.

- c. Seat the "ink-motion-throw-off-handle" into it's "On" position and manually "drop" form rollers to plate.
- d. Using adjusting screws, adjust both operator and gear-side settings of form roller for identical pull between form and vibrator roller, as well as between form roller and plate.

NOTE: Make sure the final adjustment of form rollers are slightly tighter to the vibrator than to the plate.

- e. Make necessary adjustments while all paper strips are positioned at their respective locations.
- f. Lock all settings.

NOTE: Double-check settings - since it is possible that they could change during the locking procedure.

- g. Position ink-motion-throw-off-mechanism into it's "Off" position.
- h. Remove feeler strips.

7. REMOVE #2 FORM ROLLER

- a. Rotate vibrator roller sleeves into their unlocked position.
- b. Remove the copper vibrator roller and sleeve.
- c. Remove #2 form roller.

8. INSTALLATION OF #1 FORM ROLLER (H)

- a. Place a bearing on each end of the #1 form roller.

NOTE: Ensure that oil holes are in the "Up" position.

- b. Seat the #1 form roller into it's brackets.
- c. Place sleeve at the end of the copper vibrator roller shaft.
- d. Position the copper vibrator roller into the press.
- e. Align the fiber block of the vibrator roller mechanism into it's correct position and seat the copper vibrator roller.
- f. Rotate the vibrator roller sleeves into their locked position.

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9. ADJUST #1 FORM ROLLER TO VIBRATOR ROLLER AND PLATE

- a. Insert a set of feeler strips between the vibrator and form roller.
- b. Insert a second set of feeler strips between the form roller and plate.

NOTE: All feeler strips should be located 2" in from ends of form roller.

- c. Seat the ink-motion-throw-off-handle into it's "On" position and manually "drop" form roller to plate.
- d. Using adjusting screws, adjust both operator and gear-side setting of form roller for identical pull between form and vibrator roller as well as between form roller and plate.

NOTE: Make sure the final adjustment of form roller is slightly tighter to the vibrator than to the plate.

- e. Make necessary adjustments while all paper strips are positioned at their respective locations.
- f. Lock all settings.

NOTE: Double check settings - since it is possible that settings could change during the locking procedure.

- g. Position ink-motion-throw-off-handle into the "Off" position.
- h. Remove all feeler strips.
- i. Do not remove the copper vibrator and #1 form roller.

10. INSTALLATION OF #3 FORM ROLLER (P)

- a. Place a bearing on each end of the #3 form roller.

NOTE: Ensure that oil holes are in the "up" position.

- b. Repeat installation steps of #1 form roller (a,b,c,d,e,f) paragraph 8.

11. ADJUSTING #3 FORM ROLLER TO VIBRATOR ROLLER AND PLATE

Repeat adjusting steps of #1 form roller (a,b,c,d,e,& f) paragraph 9.

12. REINSTALL #2 FORM ROLLER

- a. Rotate the chrome vibrator roller sleeves into the unlocked position and remove the vibrator roller.
- b. Repeat installation steps of #2 form roller (a,b,c,d,e,f) paragraph 5.

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13. INSTALLATION OF INTERMEDIATE ROLLERS (G,K & M)

- a. Place a bushing on each end of the first Intermediate roller (G) and seat it between form roller (I H) and the non-removable vibrator roller (F)
- b. Seat the second intermediate roller (K) in it's fittings above and riding on the removable copper vibrator roller (I).
- c. Seat the third intermediate roller in it's fittings above and riding on the removable steel vibrator roller (N).

14. INSTALLATION OF THE RIDER ROLLER (L)

- a. Locate rider roller.
- b. Seat rider roller on top and between the two intermediate rollers (M&K).

15. ADJUSTING THE AUXILIARY VIBRATOR ROLLER (O)

- a. Insert feeler strips in their appropriate position.
- b. Loosen lock nuts.
- c. Use thumbscrews and adjust both operator and gear-side for identical pull.
- d. Lock setting.
- e. Remove feeler strips.

16. ADJUSTING THE INTERMEDIATE ROLLER (E)

- a. Insert feeler strips in their appropriate position.
- b. Using the spring mechanism, adjust for identical pull between vibrator roller (F), top vibrator roller (C) and intermediate roller E.

NOTE: This adjustment is only made while under the close supervision of the instructor.

- c. Secure settings.
- d. Remove feeler strips.

17. ADJUSTING THE TOP INTERMEDIATE ROLLER (D)

- a. Insert feeler strips in their appropriate position.
- b. Loosen lock nuts.
- c. Using thumbscrews, adjust for identical pull between the top intermediate (D) and top vibrator roller (C).
- d. Secure lock nuts.
- e. Remove feeler strips.

18. INSTALLATION OF THE DUCTOR ROLLER (B)

- a. Loosen thumbscrews and clear clamp plates.
- b. Seat ductor roller into it's brackets.
- c. Position clamp plates.
- d. Secure thumbscrews.

19. ADJUSTING THE DUCTOR ROLLER (B) TO INK FOUNTAIN ROLLER (A)

- a. Insert a feeler strip at center of ductor roller, (between fountain and ductor roller).
- b. Rotate the press manually until the ductor roller assembly is on high cam.
- c. Loosen cap screw.
- d. Using the eccentric stud, adjust for an even pull between the ductor and ink fountain roller.
- e. Secure cap screw.
- f. Remove feeler strip.

PREPARE INKING ASSEMBLY

Outlined Procedure Sheet #1

(ATF-DP)

1. Perform manual and visual safety check.
2. Explain parts and function of the ink fountain.
3. Point out and explain parts and function of the automatic ink control unit.
4. Installation of #2 form roller.
5. Adjusting #2 form roller to vibrator roller and plate.
6. Remove #2 form roller.
7. Installation of #1 form roller.
8. Adjusting #1 form roller to vibrator roller and plate.
9. Installation of #3 form roller.
10. Adjusting #3 form roller to the vibrator roller and plate.
11. Reinstall #2 form roller.
12. Installation of intermediate rollers.
13. Installation of the rider roller.
14. Adjusting of the auxiliary vibrator roller.
15. Adjusting the intermediate roller #2.
16. Adjusting the top intermediate roller.
17. Installation of the ductor roller.
18. Adjusting the ductor roller to ink fountain roller.

APPENDIX A to
Student Practical Exercise 12/77

INKING ASSEMBLY

Detailed Procedure Sheet #2

Harris LXG

1. PERFORM A VISUAL AND MANUAL SAFETY CHECK.

2. INK FOUNTAIN

a. Ink Fountain Blade:

When in the closed position, loosen four locking bolts to allow the blade to swing open.

b. Fountain Roller:

Check and clean fountain roller, turn the roller by using the manual handle to see if it turns free. Lubricate ends if and when, necessary.

c. Fountain Blade:

Check blade for any excessive pressure from the keys before locking the blade into position.

3. AUTOMATIC INK CONTROL UNIT

Check operation of:

- (1) Ink Feed Control
- (2) Ductor Roller Control Latch
- (3) Manual Handle

4. PARALLEL ALL ECCENTRICS AND PLATE ADJUSTING SCREWS

Note: High point of eccentrics should be between vibrator and plate.

5. INSTALLATION OF #2 FORM ROLLER

a. Install #2 form roller with red end toward gear side.

Note: The plate must be properly packed and mounted prior to installation and setting for form rollers. All rollers will be installed with red end toward gear side of press.

- b. Insert roller bearing into yellow end of roller; remove end play.
- c. Tighten pipe plug.
- d. Adjust form roller to vibrator by touch; then add 1/8" turn on eccentric.
- e. Lock eccentrics.
- f. Ink up the vibrator using a hand roller.

Note: Put a medium coating of ink on the vibrator.

- g. Call clear.
- h. Run the press until the ink smooths out on the rollers.
- i. Shut down the press and let press sit approximately 15 seconds.
- j. Call clear.
- k. Inch press forward until nip is visible on the vibrator.
- l. Using a paper feeler strip, apply directly over nip, and press down on feeler strip. Remove feeler strip and measure nip. The nip should be between 5/32 and 3/16 inches; if not, adjust accordingly.

6. INSTALLATION OF #1 FORM ROLLER

Repeat steps a. through j. (Insert roller bearing into red end of roller) of Paragraph #3 (step f. only needed).

7. INSTALLATION OF #3 FORM ROLLER

Repeat steps a. through j. (Insert roller bearing into red end of roller) of Paragraph #3.

8. INSTALLATION OF #4 FORM ROLLER

Repeat steps a. through j. of paragraph #3; only you will have to jog the press in reverse to obtain nip readings.

9. SETTING OF FORM ROLLERS TO PLATE

- a. Call clear.
- b. Jog press until plate cylinder clamps are facing toward the delivery end.

- c. Lower ink motion throw-off handle to allow the form rollers to touch the plate; allow rollers to sit on plate for approximately 15 seconds, then raise ink-motion-throw-off-handle.
- d. Call clear.
- e. Jog the press until the first form roller stripe appears on the plate, this is the #4 form roller.
- f. Unlock form roller adjusting screw lock.
- g. Adjust the #4 plate adjusting screw to obtain a 1/8" stripe to the plate.
- h. Lock form roller adjusting screw.
- i. Repeat steps d. through g. for all other form rollers using adjusting screws that correspond to the other form rollers.
- j. With all form rollers set, call "Clear", and start up press and lower ink-motion-throw-off handle to the plate; allow the plate to blackout to check form roller settings for excessive bounce. Raise ink-motion-throw-off-handle when excessive bounce is removed from all rollers.
- k. Clean the plate with a rag and solvent; then wipe it dry.
- l. Recheck form roller settings to the plate.
- m. Wash up plate and wipe dry.

10. INSTALLATION OF THE LOWER RIDER ROLLER

- a. Install lower rider roller through press frame into roller bracket on gear side.
- b. Center and secure roller bracket on operator side.

11. INSTALLATION OF THE INTERMEDIATE ROLLERS

- a. Install two intermediate rollers in their appropriate brackets located on the delivery end of the assembly.
- b. Install two intermediate rollers in their appropriate brackets located on the feeder end of the assembly.
- c. No adjustment is required.

12. INSTALLATION OF THE REMOVABLE VIBRATOR ROLLER

- a. Place roller in appropriate position.
- b. Ensure bushing flats are positioned properly on inker frame.
- c. Ensure roller gear is meshed properly with drive gear.
- d. Secure locking bolts.
- e. Using special "T" wrench, turn cam to on position to secure the intermediate rollers in place.

13. INSTALLATION OF THE DISTRIBUTING AND RIDER ROLLERS

- a. Install rubber rollers into the slotted brackets located on the top of the assembly.
- b. Position the steel rider rollers on top of the rubber distributing rollers.
- c. Insert retaining cotter pins to secure the rollers.

14. INSTALLATION OF THE DUCTOR ROLLER

- a. Loosen lock screws.
- b. Move eccentrics to determine direction of movement.
- c. Parallel eccentrics in the up position.
- d. Secure lock screw on gear side.
- e. Install ductor roller and adjust bearing pin to eliminate end play.
- f. Secure lock screw on operator side.

15. ADJUSTING DUCTOR ROLLER TO VIBRATOR ROLLER

- a. Call clear; jog press until the cam roller is in its highest position (the ductor roller should be touching the vibrator roller).
- b. Apply a medium amount of ink to both ends of vibrator roller.
- c. Call clear.
- d. Start press and let ink smooth out.
- e. Shut down press; put "safe's" on and let press sit for approximately 15 seconds.

- e. Loosen appropriate locking screw when making adjustment.
- f. Adjust eccentrics on both operator and gear side for identical NIP.

Note: Turn eccentrics in the direction of the #3 form roller arrows.

- g. Secure appropriate locking screw after adjustment is made.

16. ADJUSTING INK FOUNTAIN ROLLER TO THE DUCTOR ROLLER

Only the instructor makes this adjustment. The students will explain the adjustment.

PREPARE INKING ASSEMBLY

Outlined Procedure Sheet #2

(Harris LXG)

1. Perform a manual and visual safety check.
2. Check ink fountain.
3. Check automatic ink controls.
4. Parallel all eccentrics and adjusting screws.
5. Install and adjust #2 form roller.
6. Install and adjust #1 form roller.
7. Install and adjust #3 form roller.
8. Install and adjust #4 form roller.
9. Adjust form rollers to plate.
10. Install lower rider rollers.
11. Install intermediate rollers.
12. Install removable vibrator roller.
13. Install distributing and upper rider rollers.
14. Install ductor roller.
15. Set ductor to vibrator roller.
16. Explain ink fountain roller to ductor roller adjustment.
17. Wash up press, then remove all rollers in reverse sequence.

PREPARE INKING ASSEMBLY
Detailed Procedure Sheet #3
(Harris L-129-BC)

1. PERFORM SAFETY CHECK.

2. INK FOUNTAIN

If in operating position, loosen the knurled nuts and move the blade to the swing open position.

a. Fountain Roller

Check and clean fountain roller. Turn the roller by the manual handle to see if it turns free. Lubricate ends of roller if necessary.

b. Fountain Blade and Keys

Check blade for any excess pressure from keys before locking blade in operating position.

3. AUTOMATIC INK CONTROL

a. Check operation of ink feed control.

b. Check operation of ductor control.

c. Check operation of auto form roll control.

4. METHOD OF SETTING INK ROLLERS

The form rollers, lower storage roller and ductor roller, will be adjusted the first time using paper strips as a gauge. The rollers will then be inked up and the final setting will be by the nip line.

a. Form roll control.

b. Manual form roll control.

(Unlock all plate adjusting lock screws.)

Note: Parallel all plate adjusting screws before starting this procedure.

5. INSTALLING AND ADJUSTING THE #2 FORM ROLLER

- a. Place the #2 form roller in position on the bearing, gear side of the press, hold the roller in position and push the bearing pin from operators side of press until the bearings are completely seated in both ends of the roller. Tighten the pipe plug screw, making sure all end play is removed.
- b. Loosen the eccentric lock screw on operators side of press.
- c. Turn the eccentric, reverse direction of arrow and insert paper strip.
- d. Adjust to desired tension by turning direction arrow points.
- e. Lock eccentric clamp screw.
- f. Repeat above steps for other end of the roller.
- g. Check that both ends are the same tension.
- h. Adjusting the #2 form roller to the plate.
- i. Insert feeler strips between the form roller and plate.
- j. Lower the form rollers to the plate.
- k. Adjust both ends of the form roller to the plate to a light even tension.
- l. Re-check form roller to vibrator pressure with form rollers in down position and also in up position.
- m. Remove paper strips.

6. INSTALLATION OF THE #3 FORM ROLLER

- a. Place the #3 form roller in position on the bearing gear side of press and push bearing pin from operators side until bearing is completely seated in roller.
- b. Tighten pipe plug screw making sure end plug is removed.
- c. Position the plate cylinder for form roller #2 to be over the cylinder gap and #3 over the tail edge of plate.
- d. To adjust the #3 form roller, follow the same procedure as form roller #2.

7. INSTALLATION OF FORM ROLLER #4

- a. Position the plate cylinder with the cylinder gap under the #4 form roller position.
- b. Move both toggle levers to the up position, being careful to move both at the same time.
- c. Install form roller #4 in same procedure as in form roller #3.
- d. Move both toggle levers to the down position, being careful to move both at the same time.
- e. Position the plate cylinder with #4 form roller just over the tail edge of the plate.
- f. Move both toggle levers to the up position, being careful to move both at the same time.
- g. To adjust the #4 form roller, follow the same procedure as form roller #3. (Leave the paper strips in place.)

8. ADJUSTING THE LOWER STORAGE ROLLER

- a. Place two paper strips between the storage roller and #4 form roller.
- b. Move the toggle levers to the down position, being careful to move both at the same time.
- c. Adjust the storage roller to form roller #4 to an even tension. (Same tension as form roller to vibrator.)
- d. Re-check tension of #4 form roller to vibrator, in both positions, forms on plate and off plate. Re-check tension of form roller to plate.
- e. Re-check tension of storage roller to form roller #4 in both positions, forms on plate and off plate. (Tension should not have changed.)
- f. Remove strips.

9. INSTALLATION OF FORM ROLLER #5

- a. Install the #5 form roller in the same manner as #3 form roller.
- b. Position the plate cylinder with #5 form roller just over the tail edge of the plate.

- c. Adjust the #5 form roller to the storage roller in the same manner that #2, #3, and #4 were adjusted to the vibrators.
- d. Adjust #5 form roller to the plate, same as form rollers #2, #3, and #4.
- e. Remove strips.

10. INSTALLATION OF THE BRIDGE ROLLER

- a. Place the bridge roller in position and push the bearing pin until completely seated.
- b. Move bearing pin out enough to allow .010 end plug.
- c. Tighten pipe plug screw.

11. FINAL SETTING OF FORM ROLLERS AND STORAGE ROLL - THE NIP METHOD

Adjusting the rollers with paper strips will bring the rollers into contact, but the adjustment must be completed by the NIP method, getting the correct contact between rollers; a measured amount of contact between the rollers and form roll to plate contact.

- a. Place a small amount of ink on the lower storage roll and let the press run until the form rollers, lower vibrators, bridge roller and storage roller are evenly inked up.
- b. Stop the press and wait at least 15 seconds. By waiting 15 seconds, a line will show on each roller where the rollers were in contact.
- c. Adjusting the #2 form roller to the vibrator
 - (1) Carefully jog the press, using the reverse button. Jog the press just enough to show the NIP or line of contact between the form roll and vibrator.
 - (2) Using small strips of paper, press strips of paper to contact line on vibrator, approximately 2" in from end of vibrator. Lift strips from vibrator, contact line and NIP will show on the paper strip. The NIP line should be 3/16" wide and even from end to end of the roller.
 - (3) Adjust as required to get correct NIP by adjusting eccentrics.

- d. Adjusting the #3 form roller to the vibrator.

Same as procedure for #2 form roller except, inch press forward to bring NIP up where accessible on the vibrator.

- e. Adjusting the #4 form roller to the vibrator.

Same procedure for #3 form roller except, inch press in reverse to bring NIP up where accessible.

- f. Adjusting the lower storage roller to the #4 form roller.

Adjust lower storage roller to #4 form until NIP line is $3/16"$. Press must be inched forward to move the NIP up where accessible.

NOTE: Harris Manual specifies NIP to lower storage roll as $1/8"$ to $5/32"$, press will not wash up unless set to $3/16"$.

- g. Adjusting the #5 form roller to lower storage roller.

Adjust #5 the same as #2,3, and 4. Reverse press to bring up NIP where accessible.

- h. Adjusting the form rollers to the plate. The NIP or contact line to the plate should be $1/8"$ to $5/32"$ wide.

(1) Manually lower the form rollers to the plate. Wait at least 15 seconds and raise the form rollers from the plate.

(2) Inch the press around and check the NIP on the plate. Using the plate adjusting screws, adjust each form to the plate as required, to have NIP line of $1/8"$ to $5/32"$ wide.

NOTE: Do not move the press until the remaining rollers are installed.

12. INSTALL THE REMAINING ROLLERS IN THE FOLLOWING ORDER

- a. Installation of distributor roller #13.

(1) Place distributor roller in position.

(2) Turn bearing retaining blocks 90° to locked position.

- b. Installation of the friction roller.

(1) Place the friction roller in position.

(2) Push the bearing pin in until bearing is seated in end of roller and all end play is removed.

(3) Tighten pipe plug screw.

c. Installation of distributor rollers #17, 15, 16, 14 and 18.

Install in the same manner as #13 and in the following order:
17, 15, 16, 14 and 18.

d. Installation of the vibrator rider roller.

(1) Raise the toggle levers to the up position.

(2) Place the bearing blocks on the end of the roller.

(3) Install the vibrator rider roller, making sure the bearing blocks are on the guide pins and the vibrator spool lines up with the cam follower.

e. Make sure the spool on the vibrator lines up with the other cam follower.

13. INSTALLATION OF THE DUCTOR ROLLER

a. Place the ductor control in the "on" position.

b. Inch the press until ductor cam roller is on the high point of ductor cam.

c. Unlock screws, item 10, photo 81.

d. Loosen screws, item 6 & 7, photo 81, until screw heads are 3/8" above the brackets.

e. Loosen screws, item 8, photo 81.

f. Place the ductor roll in position and seat bearing and center ductor, side to side in relation to the fountain roller. Lock screws item 8, photo 81.

g. Place paper strips between the ductor and vibrator roller, 2" from each end.

h. Turn screws item 6, photo 81, alternate between screws to adjust to the vibrator roller. Adjust to an even tension. Lock locking screws.

i. Inch the press until the cam roller is on the low dwell of the cam.

14. FINAL ADJUSTMENT OF THE DUCTOR ROLLER

- a. Run the press until all the rollers are inked up.
- b. Place the ductor control in the "on" position.
- c. Inch the press until the ductor arm is on high cam.
- d. Adjust ductor for a $1/8$ " to $5/32$ " NIP.
- e. Inch the press until the ductor is on low cam.
- f. Adjust the ductor for a $1/8$ " to $5/32$ " NIP to the fountain roll.

15. FINAL ADJUSTMENT OF FORM ROLLERS TO PLATE

- a. Run the press until all rollers are inked properly.
- b. Make final check of form rollers to plate.
- c. Lock all plate adjusting screws and storage roll adjusting screws.

NOTE: When removing the form rollers from the press, #3 form roller bearing may hit the roller hanger. The eccentric must be unlocked and turned to a position to let the bearing move past the roller hanger.

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PREPARE INKING ASSEMBLY
Outline Procedure Sheet #3
(Harris L-129-BC)

1. PERFORM SAFETY CHECK
2. INK FOUNTAIN
 - a. Check keys.
 - b. Place blade in swing open position.
3. AUTOMATIC INK CONTROL
 - a. Check operation of ink feed control.
 - b. Check operation of ductor control.
 - c. Check operation of auto form roll control.
4. METHOD OF SETTING INK ROLLERS
 - a. Set to vibrator.
 - b. Set to plate.
 - c. Preliminary setting with paper strips.
 - d. Final adjustment by NIP line.
5. INSTALLATION OF THE #2 FORM ROLLER

Adjusting the #2 form roller to the vibrator roller.
6. INSTALLATION OF THE #3 FORM ROLLER
 - a. Position the plate cylinder.
 - b. Adjusting the #3 form roller to the vibrator roller.
7. INSTALLATION OF THE #4 FORM ROLLER

NOTE: Follow steps a. and b. before installing #4 form roller.

- a. Position the plate cylinder with the cylinder gap under #4 roller position.
- b. Move both toggle levers both at the same time to the up position.
- c. Install #4 form roller.
- d. Move both toggle levers at the same time to the down position.
- e. Position the plate cylinder with #4 form just on the tail edge of the plate.
- f. Adjust to vibrator.

NOTE: Leave paper strips in position.

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8. ADJUSTING THE LOWER STORAGE ROLLER

- a. Adjust storage roller to #4 form roller, same tension as form roller to vibrator.
- b. Re-check tension of #4 form roller to vibrator and form roller to plate. Tension should not have changed.
- c. Remove all paper strips.

9. INSTALLATION OF THE #5 FORM ROLLER

- a. Position the plate cylinder.
- b. Adjusting the #5 form roller to the storage roller.

10. INSTALLATION OF THE BRIDGE ROLLER

- a. Install and completely seat bearing in roller.
- b. Pull out on bearing pin enough to have .010 end play in roller.
- c. Tighten pipe plug screw.

11. FINAL ADJUSTMENT OF FORM ROLLERS AND STORAGE ROLLER, NIP OR INK LINE

- a. Ink up rollers.
- b. Adjust #2, 3, and 4 to vibrators to 3/16" NIP.
- c. Adjust storage roll to #4 to 3/16" NIP.
- d. Adjust #5 to storage roll, to 3/16" NIP.

12. FINAL ADJUSTMENT OF FORM ROLLS TO PLATE

- a. Manually lower form rollers to plate and wait 15 seconds.
- b. Raise forms to "off" position.
- c. Adjust form rolls to 1/8" to 3/16" NIP.

13. INSTALL REMAINING ROLLERS

- a. Install distributor roller #13.
- b. Install friction roller #12.
- c. Install the remaining distributor rollers in the following order: #17, 15, 16, 14 and 18.
- d. Install the vibrator rider roller:
 - (1) Raise toggle levers to "up" position.
 - (2) Place bearing blocks on roller ends.
 - (3) Install the roller making sure the bearing blocks are on the guide pins and the vibrator spool lines up with the cam follower.
 - (4) Make sure the spool on the vibrator lines up with the other cam follower.
 - (5) Return the toggle levers to the down position.

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14. INSTALLATION OF THE DUCTOR ROLLER

- a. Move the ductor control to the "on" position.
- b. Inch the press until the ductor cam roll is on the high part of the cam.
- c. Loosen the four locking screws and back out the adjusting screws $\frac{3}{8}$ ".
- d. Install the ductor roller, being careful to center, side to side.
- e. Adjust the ductor to the vibrator and lock locking screws.
- f. Inch the press until the ductor cam roll is on the low dwell of the cam.
- g. Adjust the ductor roller to the fountain roller and lock locking screws.

CAUTION: When adjusting the ductor roller, hold the short end of the allen wrench between the thumb and forefinger. If, before you get the proper tension on the paper strips, the adjusting screws feel they have reached bottom, do not force them.

15. FINAL ADJUSTMENT OF THE DUCTOR ROLLER

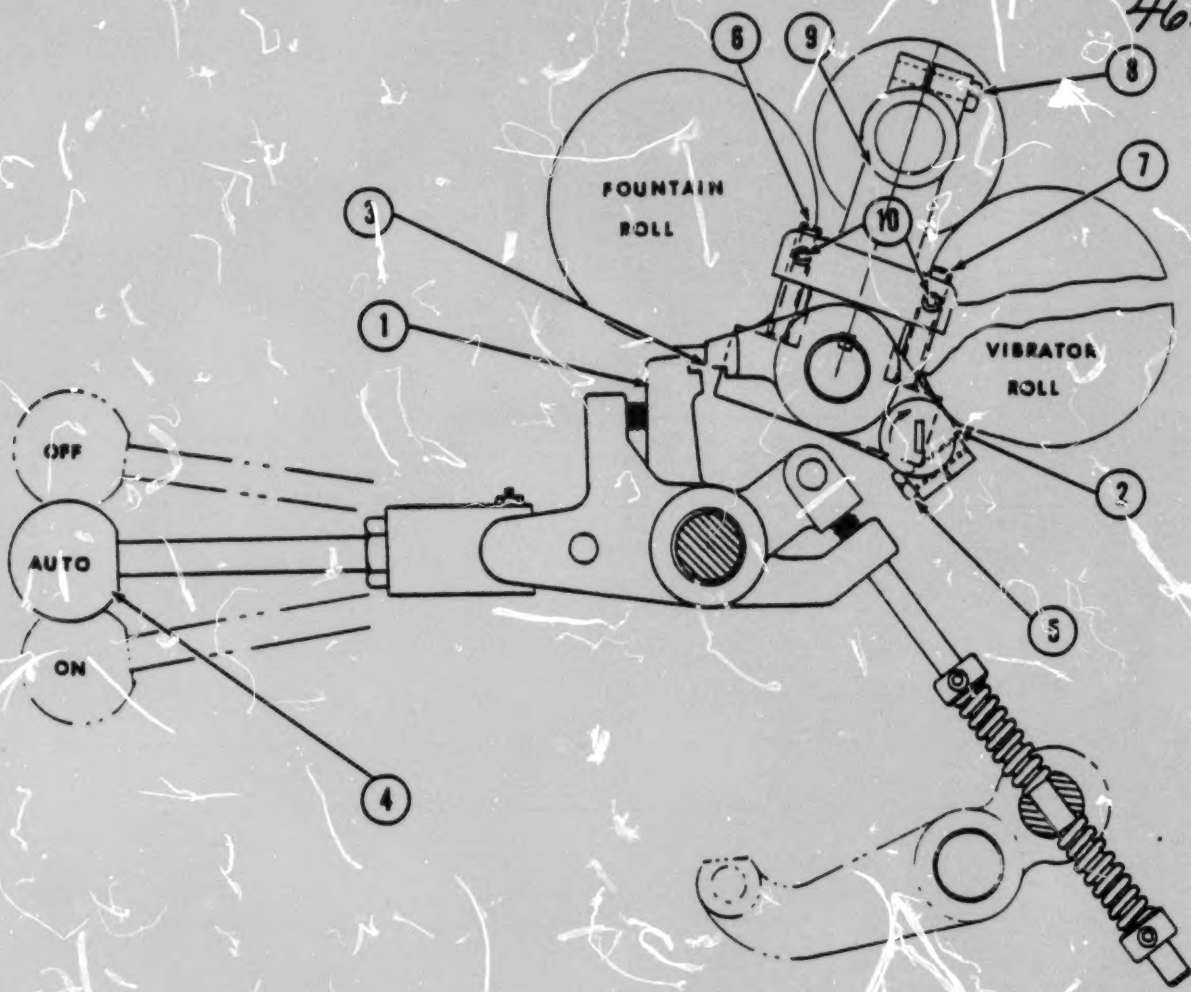
- a. Let the press run until all rollers are inked up.
- b. Set the ductor to a $\frac{1}{8}$ " to $\frac{5}{32}$ " NIP to the vibrator.
- c. Set the ductor to a $\frac{1}{8}$ " to $\frac{5}{32}$ " NIP to fountain roll.

16. Final check of form rollers to plate

- a. Make final check of form rollers to plate.
- b. Lock all adjusting screws.

450

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451

INKER ROLL ARRANGEMENT

L-129 PRESSES

Roll No.	Roll Description	Diameter	Harris Part No.
1	MICRO FLO FORM CONV. FTN FORM	4.000 2.375	LXV-2139 (STD.) LXV-2371 (OPT.)
2	FORM ROLL	2.438	LXV-2367
3	FORM ROLL	2.500	LXV-2368
4	FORM ROLL	2.562	LXV-2369
5	FORM ROLL	2.625	LXV-2370
6	VIB. ROLLER	3.030	LXV-2198
7	VIB. ROLLER	3.030	LXV-2539
8	VIB. ROLLER	3.030	LXV-2196
9	VIB. ROLLER	3.030	LXV-2194
10	STOR. ROLL	2.575	LXV-2192
11	BRIDGE ROLL	2.250	LXV-2540
12	FRICTION ROLL	2.167	LXV-2190
13	DIST. ROLL	2.688	LXV-2364
14	DIST. ROLL	2.688	LXV-2364
15	DIST. ROLL	2.125	LXV-2361
16	DIST. ROLL	2.125	LXV-2361
17	DIST. ROLL	2.125	LXV-2361
18	DIST. ROLL	2.125	LXV-2361
19	LOWER STOR. ROLL	2.575	LXV-2198
20	VIB. RIDER ROLL	2.125	LXV-2529
21	DUCTOR ROLL	2.312	LXV-2366
22	INK FOUNTAIN ROLL	3.250	LXV-2098

L-136 PRESSES

Roll No.	Roll Description	Diameter	Harris Part No.
1	FORM ROLL DAHLGREN FORM ROLL	2.375 4.000	LXM-627 (STD.) (OPT.)
2	FORM ROLL	2.438	LXM-628
3	FORM ROLL	2.500	LXM-629
4	FORM ROLL	2.562	LXM-630
5	FORM ROLL	2.625	LXM-631
6	VIB. ROLL	3.030	LXM-636
7	VIB. ROLL	3.030	LXM-602
8	VIB. ROLL	3.030	LXM-635
9	VIB. ROLL	3.030	LXM-634
10	STOR. ROLL	2.575	LXM-633
11	BRIDGE ROLL	2.250	LXM-603
12	FRICTION ROLL	2.167	LXM-632
13	DIST. ROLL	2.688	LXM-626
14	DIST. ROLL	2.688	LXM-626
15	DIST. ROLL	2.125	LXM-625
16	DIST. ROLL	2.125	LXM-625
17	DIST. ROLL	2.125	LXM-625
18	DIST. ROLL	2.125	LXM-625
19	LOWER STOR. ROLL	2.575	LXM-637
20	VIB. RIDER ROLL	2.125	LXM-601
21	DUCTOR ROLL	2.312	LXM-542
22	INK FOUNTAIN ROLL	3.250	LXM-479

Note: ALL BARE ROLLS COPPER PLATED (STD.), EXCEPT FOR INK FOUNTAIN ROLL 22.

494

493

492

465

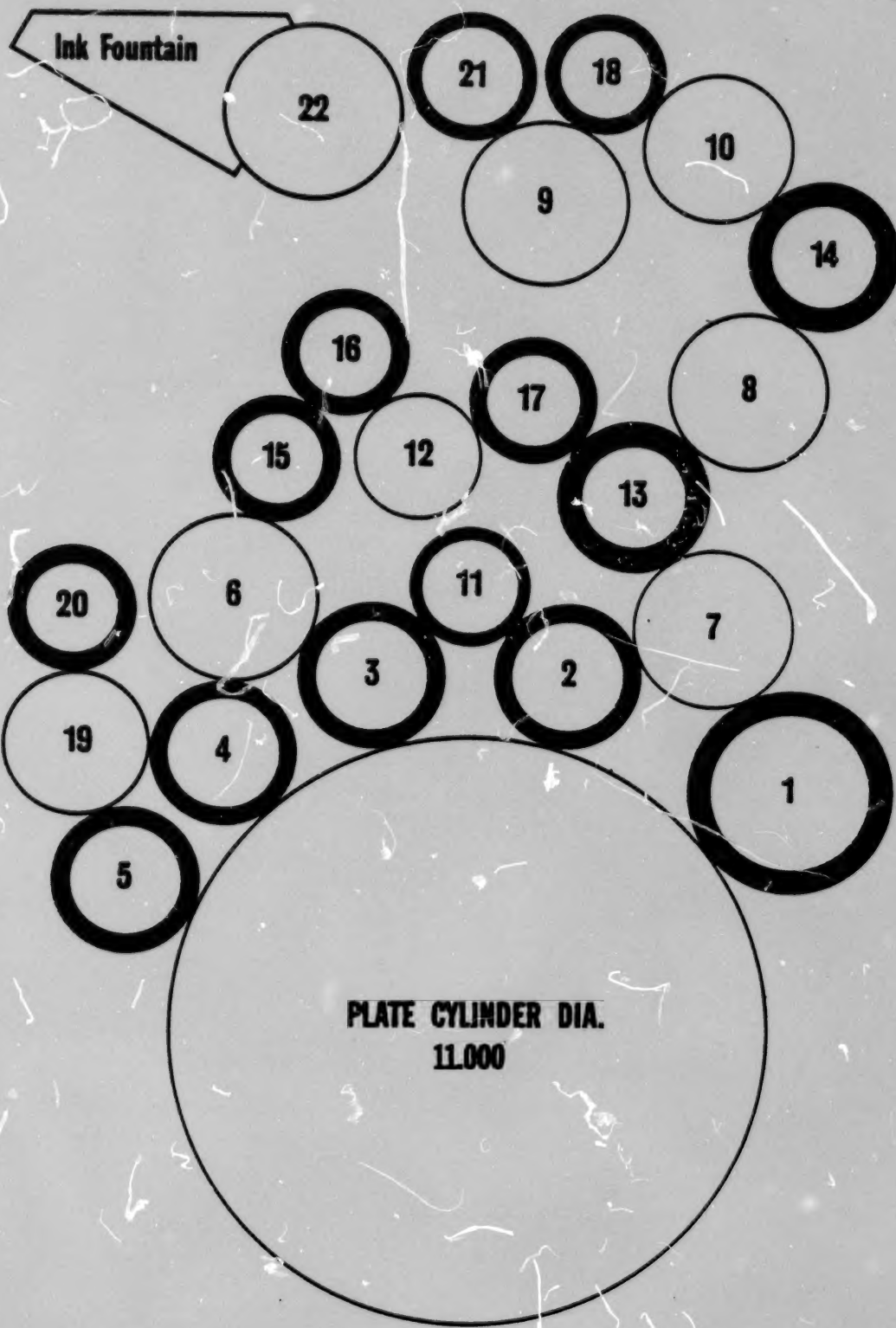


PLATE CYLINDER DIA.
11.000

466

740-303-B-040
Exam Support Sheet
A-1, B-1, C-1

EXAMINATION SUPPORT SHEET

LESSON: Prepare Inking Assembly

OBJECTIVE: The student will be examined to determine his/her ability to:

1. Make a safety check prior to operation and observe all safety precautions throughout the exercise.
2. Demonstrate and explain the manual and operational controls.
3. Install and adjust all adjustable rollers using feeler strips to acquire the desired tension between the vibrator roller and then between the plate.
4. Complete the installation of all remaining rollers in the correct sequence.
5. Demonstrate and explain the adjustment and operational function of the ink fountain assembly.

STUDENT MATERIALS AND EQUIPMENT:

1. Feeler strips .003 to .004 thick - as required
2. Press Tool Kit - 1 per press
3. A small or medium size offset press - 1 per designated group

SPECIAL REQUIREMENTS:

1. One assistant instructor per 2 designated groups.
2. Time required: 2 hours per student.

ADMINISTRATIVE INSTRUCTIONS:

1. This is a combination exam. It combines performance tasks to determine if the student can install and adjust all adjustable rollers in the inking assembly, along with verbal responses to determine if the student can utilize and explain the various controls of the inking assembly.
2. One hour and 45 minutes should be allowed to complete this exam and 15 minutes for the assistant instructor to grade and critique each student.
3. Exam sheets are located in the division office and are identified as practical exercise grading sheet A-1, B-1 or C-1, lesson 740-303-B-040. The same grading is used for all classes.

PRACTICAL EXERCISE GRADING SHEET

NAME

ROSTER NO.

STARTING TIME

FINISH TIME

GRADER

DATE

GRADE

MANNER OF PERFORMANCE FOR INKING ASSEMBLY

OBJECTIVES (L-129-BC)

1. Adjustment of #2 Form Roller

WTS PEN CRS

20

2. Adjustment of #3 Form Roller

20

3. Adjustment of #4 Form Roller

20

4. Adjustment of the Storage Roller

10

5. Adjustment of the #5 Form Roller

20

6. Installing the Bridge Roller

10

7. Adjusting the Ductor Roller

20

8. In Controls

a. Explain use of the ink feed control

6

b. Explain use of the manual handle

6

c. Explain use of the ductor control

6

d. Explain use of the form roll control

12

(Manual and Automatic)

9. OBSERVANCE OF SAFETY REGULATIONS

Number of violations /1/2/3/4/5/6/ 5 pts each

10. PRESS TECHNIQUES

Number of violations /1/2/3/4/5/6/ 2 pts each

REMARKS:

TOTAL 150

F-2

468

(L-129-BC)
PRACTICAL EXERCISE TEST
INKING ASSEMBLY
INSTRUCTORS CUT SHEET

STUDENT TIME ALLOWED: 80 minutes

INSTRUCTOR'S TIME ALLOWED: 20 minutes

- 1-3. a. Vibrator pressure
One end wrong - minus 5
Two ends wrong - minus 10
Failed to lock setting - minus 5
- b. Plate pressure
One end wrong - minus 5
Two ends wrong - minus 10
Failed to lock setting - minus 5
4. Pressure to form roller
One end wrong - minus 5
Two ends wrong - minus 10
Failed to lock setting - minus 5
5. a. Pressure to storage roll
One end wrong - minus 5
Two ends wrong - minus 10
Failed to lock setting - minus 5
- b. Pressure to plate
One end wrong - minus 5
Two ends wrong - minus 10
Failed to lock setting - minus 5
6. Installation of bridge roller
Too much end play - minus 5
No end play - minus 5
7. a. Pressure to vibrator
One end wrong - minus 5
Two ends wrong - minus 10
Failed to lock setting - minus 5
- b. Pressure to fountain roll
One end wrong - minus 5
Two ends wrong - minus 10
Failed to lock setting - minus 5
8. a. Yes or No
b. Yes or No
c. Yes or No
d. One error - minus 6
Two errors - minus 12

PRACTICAL EXERCISE GRADING SHEET

NAME

ROSTER NO.

STARTING TIME

FINISH TIME

GRADER

DATE

GRADE

MANNER OF PERFORMANCE FOR INKING ASSEMBLY

OBJECTIVES (LXG)

1. Adjustment of #2 Form Roller

WTS PEN CRS

24

2. Adjustment of #1 Form Roller

24

3. Adjustment of #3 Form Roller

24

4. Adjustment of #4 Form Roller

24

5. Paralleling of Ductor Roller to Vibrator

11

6. Explain Adjustment of Fountain Roller to Ductor

9

7. Ink Controls

a. Explain use of the feed handle

9

b. Explain use of the manual control handle

7

c. Explain use of ductor roller control handle

9

d. Explain ink motion throw-off handle

9

8. OBSERVANCE OF SAFETY REGULATIONS

Number of violations

/1/2/3/4/5/6/

5 pts each

9. PRESS TECHNIQUES

Number of violations

/1/2/3/4/5/6/

2 pts each

REMARKS:

TOTAL 150

470

(LXG)
PRACTICAL EXERCISE TEST
INKING ASSEMBLY
INSTRUCTORS CUT SHEET

STUDENT TIME ALLOWED: 1 hour and 50 minutes

INSTRUCTOR'S TIME ALLOWED: 10 minutes

- 1-4. a. Vibrator pressure
One end wrong - minus 6
Two ends wrong - minus 12
Failure to lock setting - minus 6
- b. Plate pressure
One end wrong - minus 6
Two ends wrong - minus 12
Failure to lock setting - minus 6
5. One end wrong - minus 5
Two ends wrong - minus 11
Failure to lock setting - minus 6
6. Yes or No
7. a. Yes or No
b. Yes or No
c. One error - minus 5
Two errors - minus 9
d. Yes or No

ROSTER NO.

STARTING TIME

FINISH TIME

DRAFT

DATE _____

	GRADE
1	100%
2	90%
3	80%
4	70%
5	60%
6	50%
7	40%
8	30%
9	20%
10	10%
11	0%

OBJECTIVES (DP)

WTS	PEN	CRS
-----	-----	-----

- 24

24

24

8

8

16

12

8. Ink Controls

- Explain use of ink motion throw-off handle
- Explain use of automatic ink control unit

117

17

9. OBSERVANCE OF SAFETY REGULATIONS

Number of violations /1/2/3/4/5/6/ x5 pts each

10. PRESS TECHNIQUES

Number of violations /1/2/3/4/5/6/ x2 pts each

REMARKS:

TOTAL	150
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E A

493

472

(DP)
PRACTICAL EXERCISE TEST
INKING ASSEMBLY
INSTRUCTOR CUT SHEET

STUDENT TIME ALLOWED: 1:50 minutes

INSTRUCTOR TIME ALLOWED: 10 minutes

- 1-3. a. vibrator pressure
One end wrong - minus 6
Both ends wrong - minus 12
Failure to lock setting - minus 6
- b. Plate pressure
One end wrong - minus 6
Both ends wrong - minus 12
Failure to lock setting 6
4. One end wrong - minus 4
Both ends wrong - minus 8
Failure to lock setting - minus 8
5. One end wrong - minus 4
Both ends wrong - minus 8
Failure to lock setting - minus 8
6. Yes or No
7. Each error - minus 4 - total 12 points
8. a. One error - minus 8
Two errors - minus 17
- b. Failed to engage pawl - minus 4
Failed to engage handle - minus 4
Failed to engage lever - minus 4
Moved handle wrong way - minus 5
Didn't understand procedure - minus 17

SOURCE MATERIALS

LESSON: Prepare Inking Assembly

LESSON OUTLINE DEVELOPMENT #1 (ATF-DP Offset Press)...

1. Ink Fountain Assembly - TM 5-245, Offset Photolithography and Map Reproduction
 - a. Paragraph 8-23
 - b. Paragraph 8-23, 8-24a(1)
 - c. Paragraph 8-23, 8-24a(1)
 - d. Paragraph 8-23, 8-24a(2)
 - e. Paragraph 8-24a(2)
 - f. Paragraph 8-23, 8-24a(3)
2. Automatic Ink Control Unit - TM 5-245
 - a. Paragraph 8-23, 8-24b
 - b. Paragraph 8-23, 8-24b
 - c. Paragraph 8-23, 8-24b
 - d. Paragraph 8-23, fig 8-42
 - e. Paragraph 8-23
3. Method of Setting Ink Rollers
 - a. Lithographers Manual, Section 6, page 12-32
 - b. TM 5-245, paragraph 8-19d(b)
 - c. TM 5-245, paragraph 8-24d(1)
 - d. TM 5-245, paragraph 8-24d(2)
4. Ink Rollers - TM 5-245
 - a. Paragraph 8-24d(1) thru (5)
 - b. Paragraph 8-24(7)
 - c. Paragraph 8-24(8)
 - d. Paragraph 8-23
 - e.

LESSON OUTLINE DEVELOPMENT #2 - (Harris LXG Offset Press)

1. Ink Fountain Assembly - Harris Operator's Manual
 - a. Paragraph 94
 - b. Paragraph 23c,d
 - c. Paragraph 23d
 - d. Paragraph 97
 - e. Paragraph 23e,d

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2. Automatic Ink Control Unit - Harris Operator's Manual

- a. Paragraph 23d
- b. Paragraph 23c
- c. Paragraph 23c
- d. Paragraph 23b, 94
- e. Paragraph 23a

3. Method of Setting Ink Rollers

- a. Lithographers Manual, Section 6, page 12-32
- b. TM 5-245, paragraph 8-19d(b)
- c. Harris Operator's Manual, paragraph 89, and by years of practical experience.
- d. Harris Operator's Manual, paragraph 89, and by years of practical experience.

4. Ink Rollers - Harris Operator's Manual

- a. Paragraph 88,89
- b. Paragraph 95
- c. Paragraph 90
- d. Paragraph 90
- e. Paragraph 91
- f. Paragraph 90
- g. Paragraph 91
- h. Paragraph 95

LESSON OUTLINE DEVELOPMENT #3 (Harris L-129-BC)

1. Ink Fountain Assembly - Harris Operator's Manual

- a. Section IX, para 3
- b. Section IX, para 3
- c. Section IX, para 1c
- d. Section IX, para 3a
- e. Section IX, para 3b

2. Automatic Ink Control Unit - Harris Operator's Manual L-129-BC

- a. Section IX, para 1b
- b. Section IX, para 1a
- c. Section IX, para 1c, Section VIII, 1a & b.

3. Method of Setting Ink Rollers

- a. Lithographers Manual, Section 6, page 12-32
- b. TM 5-245, paragraph 8-19d(b)
- c. Section VIII, para 5

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- d. Section VIII, para 5
- e. Section VIII, para 5

4. Ink Rollers - Harris Operator's Manual (L-129-BC)

- a. Section VIII, Photo 74 & 74a
- b. Section VIII, Photo 74 & 74a
- c. Section VIII, Photo 74 & 74a

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SUPPLEMENTAL SOURCE MATERIAL #1

ATF 29 DP

1. INK FOUNTAIN

a. Ink fountain. This is a term that describes the parts that hold the ink that is used for printing and consists of several parts, a fountain roller, a fountain blade with keys for adjustment and necessary brackets or holders for attachment to the press. The ink fountain is cleaned when change of ink is required and at the end of each working day. Thorough cleaning will remove paper lint, dried ink, chemicals from the dampening system, and other undesirable impurities. A clean ink fountain with clean ink gives a better printed job. The ink fountain is greased at each color-wash-up in order to force out ink which usually finds its way into the crevice at the ends.

b. Fountain roller. The fountain roller is a metal roller permanently mounted in the frame of the press. It is not adjustable except for the amount of rotation discussed later on. The roller is kept free of dried ink by washing with solvent when necessary.

c. Manual handle. The manual handle, located on the gear side of the press, is used to turn the fountain roller by hand when putting ink into the fountain, making the initial setting for ink distribution and during the wash-up of the press. The manual handle has a pawl attached to the side which engages the ratchet attached to the fountain roller. Care should be taken to fully engage the pawl into the teeth of the ratchet to prevent breaking or undue wear of the ratchet teeth and the pawl. The pawl and the manual handle are oiled at the beginning of each shift and cleaned during press wash-up.

d. Fountain blade. The fountain blade is made of flexible spring steel. Care must be taken so that the blade is not bent or nicked. The fountain blade is mounted at an angle to the fountain roller to make a trough to hold the ink against the fountain roller. The front edge of the fountain blade is adjustable with the fountain keys, discussed later, to allow a film of ink to pass through a gap between the fountain blade and the fountain roller and adhere to the fountain roller. The back edge of the fountain blade is attached to the press with bolts. The blade must be firmly held in place. Use care and the proper size wrench when tightening or loosening the three bolts holding the fountain blade in place. The fountain blade is removed and cleaned thoroughly at each wash-up. To remove the fountain blade, loosen the three bolts, and pull the fountain blade free from the press.

e. Abutment plate rod assembly. The abutment plate rod assembly is located under the fountain blade and over the fountain keys to prevent

the fountain keys from forming dents in the fountain blade and to allow for easier and better adjustment of the ink flow. The abutment plate rod assembly is carefully removed for cleaning at each wash-up. Do not bend or damage the assembly. Replace the assembly after completing the fountain wash-up taking care to see that the abutment plate rod assembly is not bent or twisted and that every fountain key is covered.

f. Fountain keys. There are 25 keys on the ATF Chief 29 (DP) press. When a key is turned clockwise, it causes the fountain blade to move toward the fountain roller, reducing the amount of ink that will flow on to the fountain roller. Counter-clockwise will cause the fountain blade to open, causing more ink to flow out. To initially set the ink flow, ink is placed in the fountain, the fountain roller turned by hand with the manual handle and the fountain keys adjusted until the desired ink flow is obtained. Final adjustment is usually made with the press running. The fountain keys are cleaned at each wash-up. If the keys become difficult to turn by hand, they are removed by screwing completely out of the press and cleaned with solvent and a brush or by soaking if necessary. Damaged keys must be replaced. Each key must be backed off sufficiently to clear the fountain blade before the fountain blade is removed for wash-up. If a key is not backed off far enough it might be hit by the fountain blade when the blade is being replaced. This will damage the edge of the blade, causing ink adjustment problems. A part of each fountain key is a calibration disk. The purpose of the disk is to assist in setting the ink flow and to prevent the blade from being forced up against the fountain roller too tight. To adjust, the calibrated disks are first loosened. Then the fountain keys are tightened sufficiently to shut off the ink flow to the fountain roller. The disks are set with the marker on zero and the disks are retightened to the fountain keys. One complete turn of the key counter-clockwise from this position is usually more than enough to provide ink for use. With the calibration disks properly set, the ink fountain keys cannot be turned in far enough to damage the fountain blade or roller. The fountain keys are adjusted to give a thin to medium film of ink to the fountain roller and the fountain roller adjusted for a long turn. A better, more consistent supply of ink is provided with this type of setting than one where a heavy supply of ink is applied to the fountain roller and the roller adjusted for a short turn.

2. AUTOMATIC INK CONTROL UNIT (ATF CHIEF 29 DP)

This is the unit that causes the ink fountain roller to rotate when the press is in operation and is located on the operator's side of the press. Keep it clean and oil at the beginning of each 8 hour shift or more often if necessary. No tools are necessary for normal adjustment of this unit.

a. Ink control handle. The ink control handle controls the rotation of the ink fountain roller. The handle knob is spring loaded and fits into holes numbered 0 through 10. 0 stops rotation and 10 gives

maximum rotation. To adjust, the handle knob is pulled out and the handle moved up or down to the desired position and the handle knob released. The spring will cause the handle knob to move into the selected index hole and remain there. The ink control handle rotates on the ink fountain shaft and the eccentric shape of the ink control handle affects the action of the ink control pawl discussed in the next paragraph.

b. Ink control pawl. The ink control pawl is attached to a casting that rotates on the ink fountain roller shaft. This casting moves in an arc of about 45 degrees each time the press cylinders make one revolution. The ink control pawl rides on the eccentric surface of the ink control handle. When the ink control handle is set on 0 the pawl is completely disengaged and cannot turn the ink fountain roller. The ink control pawl can also be lifted free of the eccentric. As the ink control handle is moved to higher numbers, the ink control pawl is lowered, causing it to engage the teeth on the ink control ratchet discussed in the next paragraph.

c. Ink control ratchet. The ink control ratchet is a gear-like device with sharp teeth designed to catch and hold the ink control pawl. The ink control ratchet is securely fastened to the ink fountain roller. When the press is in operation and on impression, with the ink control handle properly set, the ink control pawl will ride over the eccentric surface of the ink control handle and drop into one of the teeth of the ink control ratchet. The ink control pawl will continue to move and will cause the ink fountain roller to rotate. The amount of rotation is controlled by the setting of the ink control handle. The teeth of the ink control ratchet must be kept free of ink and dirt to permit proper engagement of the pawl.

d. Ink control lever. The ink control lever causes the ink control pawl to drop into place when the press goes on impression and lifts the pawl up when the press goes "off impression." The upper part of the lever fits loosely around the ink fountain roller shaft. The lower end of the ink control lever fits over a stud on the inside of the ink motion throw-off handle, which is described in the next paragraph. When the press is in operation and on impression, the ink control lever is in it's lowest position. The ink control pawl moves over the eccentric of the ink control handle and engages the teeth of the ink control ratchet. When the press is operating but not on impression, the ink control handle is in it's upper most position. The ink control pawl then rides on the ink control lever and cannot engage the teeth of the ink control ratchet. The ink control lever may be operated manually. If it is necessary to stop the rotation of the ink fountain roller for a few revolutions when the press is operating and on impression the lever is lifted. To resume rotation of the ink fountain roller the lever is dropped back into place. During make-ready and ink adjustment when the press is operating but not on impression the ink fountain roller can be made to turn automatically by lifting the ink control lever off the stud and lowering the lever.

After adjustment, lift the lever back in place to stop the ink fountain rotation. If the lever is down and the press is put on impression, the lever will automatically return to its position on the stud. The main purpose of the ink control lever is to prevent an excessive amount of ink being piled on the rollers from the fountain while the press is in operation but not on impression.

e. Ink motion throw-off handle. The ink motion throw-off handle is used to control the position of the form rollers in relation to the plate. This handle is connected to the impression cylinder linkage arm. The ink motion throw-off handle has three positions, down, up, and lock-up. The handle has a knurled spring loaded cover which has a shoulder on one side. When it is necessary to keep the form rollers up when mounting a plate, the cover is pulled out which disconnects the handle from the impression cylinder linkage. This is known as the lock-up position. While in lock-up position, form rollers can be lowered or raised manually. Rotate cover until shoulder is in up position, this allows the pin to lock handle to impression cylinder linkage. In this position, form rollers will be lowered to plate automatically when the press goes on impression and raised to up position when impression is tripped off.

3. INK ROLLERS

a. Ductor roller. The ductor roller conveys ink from the fountain roller to the rest of the inking assembly rollers by being in contact with the fountain roller part of the time and then arcing over to touch the vibrator the remainder of the time.

b. Intermediate rollers. The intermediate rollers transfer ink from one roller to another. They have their own bearings, do not oscillate, and are friction driven.

c. Rider roller. The rider roller is non-oscillating and not adjustable. It rides on two intermediate rollers and transfers ink.

d. Vibrator rollers. The vibrator rollers do most of the work of smoothing out and distributing the ink evenly to the form rollers. The vibrator rollers move from side to side along their axis as they rotate.

e. Form rollers. During the printing cycle, the form rollers move into contact with the plate and transfer ink to the plate.

4. METHOD OF SETTING INKING ASSEMBLY

a. Accuracy. All adjustments of the ink rollers must be as accurate as possible. A form roller that is set too light on one end will not transfer ink to the plate or may not pick up ink from the vibrator roller. A roller that is set too tight to the plate tends to bounce when hitting the leading edge of the plate causing undue wear on the equipment and may

miss part of the image that should be inked. A tight ink roller will also cause the plate image to wear off and can cause scum in the non-printing area by scrubbing ink off onto the non-printing areas.

b. Adjustment to parallel. To operate effectively, all the rollers must be parallel to each other and to the plate. The first adjustment of a roller will be to the vibrator roller.

c. Adjustment to plate. Once a form roller has been adjusted and paralleled with the vibrator roller, the plate adjustment can be made. This adjustment generally will not affect the previous adjustment to the vibrator, but after the plate adjustment has been made, the adjustment between roller and vibrator will be checked and re-adjusted if necessary. It is good practice to re-check each roller after an adjustment has been made.

d. Feeler strips. A convenient gauge for testing the adjustment of the rollers is a strip of paper about 1½" wide, 24" long and .003 to .004" thick. One strip of paper is placed at each end of the roller being adjusted. The roller is brought into contact with either the vibrator or plate, and the necessary adjustments are made while pulling on the strips of paper to get an even tension on each end of the roller.

e. Ink form rollers. Remove the three intermediate rollers, rider roller, two removable vibrator rollers, number one and three form rollers.

(1) #2 form roller.

(a) Setting to the vibrator.

1. Seat vibrator roller in place and lock down.
2. Adjust with allen screws under roller.
This adjustment has no locking device.
3. Check this adjustment with the ink motion throw-off handle in both positions.

(b) Setting to the plate.

1. Adjustment is made with allen screw which has a locking nut that fits over the screw itself.
2. This adjustment is located at the top of the roller socket. Check adjustment to vibrator and readjust if necessary.

(2) #1 form roller.(a) Setting to the vibrator.

1. Take out the copper vibrator roller and the #2 form roller.
2. Place in position the #1 form roller and the copper vibrator roller.
3. Make adjustment with allen screw (top rear). This adjustment has no locking device. Check this adjustment with the ink motion throw-off handle in both positions.

(b) Setting to the plate.

1. Adjustment is an allen screw with a locking nut that fits over the screw itself.
2. This adjustment is located at the top of the roller socket. Check and readjust to vibrator if necessary.
3. Remove the #1 form roller and the copper vibrator.

(3) #3 form roller.(a) Setting to the vibrator.

1. Replace #3 form roller and vibrator roller.
2. Adjust with allen screws under roller, this adjustment has no locking device.
3. Check this adjustment with the ink motion throw-off handle in both positions.

(b) Setting to the plate.

Same as the other form rollers.

f. Auxiliary vibrator roller. Set the auxiliary vibrator roller to the #3 form roller by means of a thumb screw on each end of the roller.

g. Intermediate rollers. Only two intermediate rollers are adjustable. One is adjustable by varying the spring tension. The other intermediate is adjusted by self locking wing bolts. This is the only one that will be adjusted by the students.

h. Ductor roller.

- (1) The ductor roller is self-parallel.
- (2) Adjust to fountain roller with eccentric stud on operator's side of the press for overall pressure.
- (3) The fountain roller is not adjustable.

SUPPLEMENTAL SOURCE MATERIAL #2

(L-129-BC)

1. PERFORM SAFETY CHECK
2. INK FOUNTAIN ASSEMBLY

a. Ink fountain. The ink fountain is a reservoir for the ink supply. The fountain is located at the top of the inking assembly. The ink fountain consists of several parts, a fountain roller, a fountain blade with keys for adjustment and a manual handle for turning the fountain roller while making the initial adjustment on the keys. The blade is mounted at an angle to the fountain roller forming a trough for the ink. The keys are mounted under the blade and by turning them clockwise, they press the blade against the fountain roller letting a thin film of ink to pass through, and counter-clockwise opens for a thicker film of ink to pass through. The ink fountain must be cleaned when going to a different color and at the end of each operating day. It is important that all working parts of the fountain be kept clean and properly lubricated.

b. Fountain roller. The fountain roller is a metal roller permanently mounted in the frame of the press. It is adjustable for the amount of rotation discussed later on. The roller is cleaned with solvent.

c. Manual Handle. The manual handle, located on the gear side of the press near the ink fountain is used to turn the ink fountain roller when putting ink into the fountain, making the initial adjustment for ink distribution and during the wash-up of the press. To operate, move the handle back and forward. The clutch will allow the roller to rotate in only one direction.

d. Fountain blade. The fountain blade is made of flexible spring steel. Care must be taken that the blade is not bent or nicked. The fountain blade is mounted at an angle to the fountain roller to form a trough to hold the ink against the fountain roller. The front edge of the fountain blade is adjustable with the fountain keys, discussed later, to allow a film of ink to pass through a gap between the fountain blade and the fountain roller and adhere to the fountain roller. In operating position the fountain blade is locked in position by two bolts with knurled nuts. The blade must be held firmly in place. Use care when moving the blade into operating position, fountain keys should not have excess pressure on the blade. The fountain blade swings down and away from the fountain roller for cleaning. Hold the hand rail on the fountain to support the blade while turning the knurled knobs to release the blade. Swing the blade down and away from the fountain roller.

APPENDIX 3 TO
SOURCE MATERIAL
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e. Fountain keys. There are 23 fountain keys on the L-129-BC press. Before locking fountain blade in operating position, care must be taken that all fountain keys are turned out of contact with the fountain blade. Keys turned in with excessive pressure on the blade can damage the blade when locking fountain blade assembly in operating position. Before placing ink in fountain, turn fountain keys clockwise until there is a light contact between fountain blade and the fountain roller. Turning keys clockwise moves the fountain blade toward the fountain roller, reducing the amount of ink that will flow on the fountain roller. Counter-clockwise will cause the fountain blade to open, causing more ink to flow out. To initially set the ink flow, ink is placed in the fountain, the fountain roller turned by hand with the manual handle and the fountain keys adjusted until the desired flow is obtained. Final adjustment is usually made with the press running. The fountain keys are adjusted to give a medium film of ink to the fountain roller and ink feed control knob is adjusted as required. With the fountain adjusted for a medium film of ink, amount of ink can be adjusted immediately by adjusting the ink feed control. The fountain keys are cleaned at each wash-up. If the keys become difficult to turn by hand, they are removed by screwing completely out of the fountain blade assembly and cleaned with solvent and oiled before replacing in the assembly. Damaged keys must be replaced.

3. AUTOMATIC INK CONTROL UNIT

This is the unit that causes the fountain roller to rotate and operates the ductor roller when the press is operating. It also controls the ink form rollers, causing them to lower to the plate and lift them off the plate at the proper time. It should be kept clean and oiled at the beginning of each 8 hour shift. No tools are necessary for normal adjustment of this unit.

a. Ink feed control knob. The ink feed control knob controls the rotation of the ink fountain roller. Located next to the control knob is a scale which reads from 0 thru 20. Turning the ink feed control knob moves a small indicator up or down the scales and indicates the amount of rotation. Turn the ink feed control knob until the indicator reads 10 on the scale when initially adjusting the ink fountain. When operating the press, turn the control knob moving indicator toward the 0 for less rotation or toward 20 for more. (More rotation is passing more ink to the rollers.)

b. Ductor roller control. The ductor roller control is a lever located immediately below the ink feed control knob. This control places the ductor roller in "Off," "Auto" or "On" position. In the Off position, the ductor stops regardless of other control settings or action of the press. In the AUTO position, the ductor automatically starts when the press goes on impression and will stop when the impression trips off. In the ON position the ductor continues to operate as long as the press runs either on or off impression.

c. Form Roll Control. The form roll control is a lever located immediately to the right of the ductor control. This control has three positions, OFF, AUTO and ON positions. In the OFF position, the form rollers are off the plate even if the press goes on impression. In the AUTO position, the form rollers automatically lower to the plate when the press goes on impression and raise automatically when the impression is tripped off. When the form roll control is manually placed in the ON position, the forms will lower to the plate, and when the press goes on impression, the form roll control will move to the AUTO position. This position is used mainly in make-ready of the press and enables the operator to lower the form rollers to the plate before the press goes on impression.

Manual Form Roll Control. The manual form roll control is located immediately below the ductor and form roll controls. This control is used to check the ink stripe (ink bead) on the plate. To lower the form roller to the plate, insert a pin wrench into the manual form roll control and pull down. If the downward motion is restricted, (do not force), open the guard on the operators side of the press and move the form roll throw-off link control knob up or down to remove the interference. When raising the form rollers to the OFF position, again move the form roll throw-off link control knob to remove interference.

4. METHOD OF SETTING INK ROLLERS

a. Accuracy. All adjustments of the ink rollers must be as accurate as possible. A form roller that is set too tight on one end will not transfer ink to the plate or may not pick up ink from the vibrator roller. A roller that is set too tight to the plate tends to bounce when hitting the leading edge of the plate causing undue wear on the equipment and may miss part of the image that should be inked. A tight ink roller will also cause the plate image to wear off and can cause scum in the non-printing area by scrubbing ink off onto the non-printing areas.

b. Adjustment to the Vibrator. To operate effectively, all the rollers must be parallel to each other and the plate. The first adjustment of a form roller will be to the vibrator roller.

c. Adjustment to the Plate. Once a form roller has been adjusted to the vibrator roller, the plate adjustment can be made. This adjustment generally will not effect the previous adjustment to the vibrator, but after the plate adjustment has been made, adjustment between the form roller and vibrator will be checked and readjusted if necessary. It is good practice to check each roller after an adjustment has been made, either to the plate or the vibrator.

d. Feeler Strips. A convenient gauge for testing the adjustment of the rollers is a strip of paper about 1½" wide and 24" long and .003 to .004" thick. One strip of paper is placed on each end of the roller being

adjusted. The roller is brought into contact with either the vibrator or plate and the necessary adjustments are made while pulling on the strips of paper to get an even tension on each end of the roller.

5. INK FORM ROLLERS

a. Installing and Adjusting the #2 Form Roller. Remove the ductor roller, six distributor rollers, one friction roller, one bridge roller, one vibrator rider roller, and the number two, three, four and five form rollers. Install the #2 form roller by placing the roller on the bearing, gear side of press and push the bearing pin from operator's side until both bearings are completely seated in the roller ends. Lock in place by tightening the pipe plug screw.

NOTE: Plate and vibrator adjustments for the form rollers are marked with arrows. Direction of arrow is for more tension, reverse direction, less tension...

Uncock plate adjusting lock screws, all form rolls. Parallel the plate adjusting screws for the #2 form roller by turning the screw head in 3/8" above the bracket.

- (1) Loosen the eccentric lock screw on operator's side of the press.
- (2) Turn the eccentric, reverse direction of arrow and insert paper strip.
- (3) Adjust to desired tension by turning direction arrow points.
- (4) Lock eccentric clamp screw.
- (5) Repeat above steps for other end of the roller.
- (6) Check that both ends are the same tension.
- (7) Adjusting the #2 form roller to the plate.
- (8) Insert feeler strips between the form roller and plate.
- (9) Lower the form rollers to the plate.
- (10) Adjust both ends of the form roller to the plate to a light even tension.
- (11) Re-check form roller to vibrator pressure with form rollers in the down position and also in the up position.
- (12) Remove paper strips.

b. Installing and Adjusting the #3 Form Roller. The #3 form roller is installed in the same manner as the #2 form roller. Also, proceed to adjust the #3 form roller following the same steps used to adjust the #2 form roller.

c. Installing the #4 Form Roller.

- (1) Inch the press until the plate cylinder gap is centered under the storage roller.

(2) Using a pin wrench in each hand, insert a pin wrench in the end of each toggle lever. Move the toggle levers to the up position, being carefull to move them both at the same time.

(3) Install the #4 form roller in the same manner as #3 form roller.

CAUTION: THE PRESS MUST NEVER BE INCHED OR RUN WITH THE TOGGLE LEVERS IN THE UP POSITION...

(4) Move the toggle levers to the down position being carefull to move both at the same time.

(5) Inch the press until the #3 form roller is just off the tail end of the plate.

(6) Proceed to adjust the #4 form roller in the same manner as #2 and #3 form rollers. Leave the paper strips in place.

d. Adjusting the Lower Storage Roller.

(1) Move the toggle levers to the up position.

(2) Insert paper strips 2" from each end, between the lower storage roller and the #4 form roller.

(3) Move the toggle levers to the down position.

(4) Turn the storage roller adjusting screws in the direction of the arrow for more tension, reverse direction for less tension. Adjust both ends of roller for even tension.

(5) Go back and check the pressure of the #4 form roller to both the vibrator and the plate. The pressure should not have changed. Remove the paper strips.

e. Installing the #5 Form Roller.

(1) Install the #5 form roller in the same manner as #3 form roller.

(2) Inch the press until the #4 form roller is just off the tail edge of the plate.

(3) Adjust the #5 form roller to the storage roll and plate in the same manner as the other form rollers. Go back and check the pressure to the storage roll with the form rollers in the on position and off position. Remove the paper strips.

f. Installing the Bridge Roller.

(1) Loosen the pipe plug screw in the bridge roller bearing pin, operator's side of the press. Push the pin back toward operator's side of the press.

(2) Place the bridge roller in position over the #2 and #3 form rollers. Push the roller over the bearing on the gear side of the press. Support the other end of the roller with one hand and with the other hand, place a T/handle allen wrench in the pipe plug screw and push the bearing into the end of the roller.

(3) Push the bearing pin until the bearings are completely seated and then move the bearing enough to allow .010" end play. Tighten pipe plug screw. No adjustment required.

g. Final Setting of Form Rollers to Vibrator and Storage Roll.

(1) Place ink on the lower storage roller and let the press run until the rollers are inked up evenly.

(2) Stop the press and wait 15 seconds. Inch the press in reverse to bring nip line from #2 form to top of vibrator. Press a strip of paper to nip line, 2" from ends of roller. Lift paper strips and measure line width. Nip should be 3/16" wide and even end to end. Adjust as required.

(3) #3 form roller uses the same procedure except that the press is inched forward to bring nip line up on vibrator.

(4) #4 form roller uses the same procedure except that the press is inched in reverse to bring the nip line to top of vibrator.

(5) To adjust the lower storage roll, inch the press forward to bring nip line to top of storage roll. Adjust storage roll if necessary to nip line of 3/16".

(6) To adjust the #5 form roller, inch the press in reverse to bring nip line to top of storage roller. Adjust #5 if required.

h. Final Adjustment of the Form Rollers to the Plate.

Using the large pin wrench, manually lower the form rollers to the plate. Wait 15 seconds and raise forms to the OFF position. Check the nip lines on the plate. They should be 1/8" to 5/16" and even end to end. Adjust if required. Lock all plate adjustment lock screws.

6. INSTALL REMAINING ROLLERS

a. Installing Distributor Roller #13 (See Inker Diagram).

(1) Using a small screwdriver, lift the bearing retaining blocks and turn them 90°.

(2) Place distributor roller #13 in position and turn the retaining blocks 90° back to their original positions.

b. Installing the Friction Roller #12 (See Inker Diagram).

(1) Loosen the pipe plug screw in the friction roller bearing pin, operator's side of press. Push the pin back toward operator's side of press.

(2) Place the friction roller over the bearing on the gear side of the press and push the bearing pin from the operator's side until both bearings are seated in the roller ends. Check and be sure all end play is removed. Tighten pipe plug lock screws.

c. Installing Distributor Rollers #17, 15, 16, 14 and 18.

- (1) Lift retaining blocks and turn them 90°.
- (2) Place #17 distributor roller in position and turn the retaining blocks 90° back to their original position.
- (3) Place #15 distributor in position, no retaining blocks for this roller.
- (4) Distributor rollers #16, 14, and 18 follow procedure as for #17 above.

d. Installing the Vibrator Rider Roller.

- (1) Raise the toggle levers to the UP position.

CAUTION: BOTH TOGGLE LEVERS MUST BE RAISED AT THE SAME TIME.

- (2) Place the bearing blocks on the ends of the vibrator rider roller.

- (3) Install the roller making sure the bearing blocks are on their guide pins and the vibrator spools line up with the cam followers.

CAUTION: RETURN THE TOGGLE LEVERS TO THE DOWN POSITION BEFORE MOVING THE PRESS.

e. Installing the Ductor Roller (Use Photo #81).

- (1) Place the ductor control in the ON position.
- (2) Open the guard door on operator's side of the press and inch the press until the cam roller is on the high part of the ductor roller cam.
- (3) Using a ½" open end wrench, unlock locking screws (item 10, photo 81).
- (4) Using a 5/32" allen wrench, loosen screws, item 6 and 7, photo 81, until heads of screws are approximately 3/8" above the brackets.
- (5) Using a ½" wrench, loosen screws, item 8, photo 81, one on each side of the press.
- (6) Place the ductor roller in position and seat the bearings in each end of the roller. Center the ductor roller in relation to the fountain roller. Make sure end play is removed and tighten screws, item 8, photo 81.
- (7) Place a paper strip 2" from each end of the ductor, between the ductor and vibrator roller.
- (8) Using the 5/32" allen wrench, insert the long end of the wrench in the screw, item 6, photo 81. Hold short end of the wrench between the thumb and forefinger, alternate between the adjusting screws at each end of the roller to bring both ends toward contact with the vibrator roller. Adjust until there is a light even drag on both strips. Lock locking screws.

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7. FINAL ADJUSTMENT OF THE DUCTOR, THE NIP METHOD

a. Adjusting the Ductor to the Vibrator. With the ductor control in the ON position, stop the press with the ductor fully down on the vibrator. Wait at least 15 seconds, then inch the press until the nip line is visible. The line or nip should be $1/8"$ to $5/32"$ wide and even from end to end. Adjust if necessary.

b. Adjusting the Ductor to the Fountain Roll. Inch the press until the ductor is in full contact with the fountain roller. Wait at least 15 seconds and manually push the ductor away from the fountain roller. Turn the fountain roller using the manual handle until the nip line is visible. The nip should be $1/8"$ to $5/32"$ wide and even from end to end. Adjust if necessary.

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LESSON REFERENCE FILE

INKING ASSEMBLY

T.440-112



MARCH 1969

US ARMY ENGINEER SCHOOL - FORT BELVOIR, VIRGINIA

TABLE OF CONTENTS

SECTION I	- Lesson Support Requirements
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NOTE: This LRF serves as the source of information for all lessons taught on this subject, though length, methods, and objectives will vary with courses. The specific length, methods and objectives will be determined by the POI and so reflect in ILPs.

This publication supersedes LRF, T.012-7 (1962),
LINKING ASSEMBLY.

SECTION I
LESSON SUPPORT REQUIREMENTS

SUBJECT: Offset Press Operation

LESSON: Inking Assembly

TRAINING AIDS AND DEVICES:

1. D. A. Training Aids: None
2. Service Training Aids: None

MATERIALS AND SUPPLIES:

Paper strips, 3/4 inch wide, .003 or .004 inch thick

EQUIPMENT:

1. Offset press
2. Press tools

FACILITIES:

1. Classroom: Equipped with desks and blackboard.
2. Training Area Facilities: Pressroom equipped with presses, cabinets and tools.

TRANSPORTATION: None

ADDITIONAL PERSONNEL AND DEMONSTRATION TROOPS:

1. Assistant Instructor(s): One assistant instructor required for each two presses.
2. Demonstration Troops: None

TEXT REFERENCES:

1. Required References:
 - a. TM 5-245 (Sep 62), Map Reproduction.
 - b. TM 5-3610-202-15 (Mar 63), Printing Press, Offset Cylinder.
 - c. Harris LXG Manufacturer's Manual.
2. Excerpted References: None

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SECTION II
LESSON OUTLINE

SUBJECT: Offset Press Operation
LESSON: Inking Assembly
TIME PERIOD (TOTAL): 23 Hours
TYPE OF LESSON: Lecture (1 hour), Demonstration (2 hours),
Student Practical Exercise (20 hours)
OBJECTIVE(S): To provide the student with a qualified
knowledge of the operation and adjustment
of the inking assembly and the safety pre-
cautions that apply.
SUPPORT REQUIREMENTS: Refer to SECTION I
STUDENT REFERENCES: Refer to Schedule of Instruction

INTRODUCTION

00:00 During our last lesson you studied the dampening
assembly. Today you are going to study the inking assembly.
The inking assembly is similar to the dampening assembly
in that it feeds and distributes ink instead of water.
More rollers are required to smooth out the ink and trans-
fer an even film of ink to the plate.

It is important that you know the number of different
rollers, how they function, how to set properly, as well
as their names and composition. Improper settings or a
roller misplaced will cause numerous difficulties.

During the demonstration look for the answer to the
following questions:

1. In what sequence are the form rollers installed
on the ATF Chief 29?
2. What adjustment is made first when setting the
form rollers on the ATF Chief 29?
3. What is the second adjustment made when setting
the form rollers on the ATF Chief 29?

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DEVELOPMENT

00:02 1. INK FOUNTAIN (ATF CHIEF 29 DP)

- a. Ink fountain
- b. Fountain roller
- c. Manual handle
- d. Fountain blade
- e. Abutment plate rod assembly
- f. Fountain keys

00:04 2. AUTOMATIC INK CONTROL UNIT (ATF CHIEF 29 DP)

- a. Ink control handle
- b. Ink control pawl
- c. Ink control ratchet
- d. Ink control lever
- e. Ink motion throw-off handle

00:08 3. INK ROLLERS (ATF CHIEF 29 DP)

- a. Ductor roller
- b. Intermediate rollers
- c. Rider roller
- d. Vibrator rollers
- e. Form rollers

00:12 4. METHOD OF SETTING INKING ASSEMBLY (ATF CHIEF 29 DP)

- a. Accuracy
- b. Adjustment to parallel
- c. Adjustment to plate
- d. Feeler strips
- e. Ink form rollers

(1) #2 form roller

- (a) Setting to the vibrator
- (b) Setting to the plate

(2) #1 form roller

- (a) Setting to the vibrator
- (b) Setting to the plate

(3) #3 form roller

- (a) Setting to the vibrator
- (b) Setting to the plate

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- f. Auxiliary vibrator roller
- g. Intermediate rollers
- h. Ductor roller

00:30 Students will now move to the press room for a demonstration on the press.

NOTE TO INSTRUCTOR: For information on para 5, 6 and 7, see APPENDIX 1 to ANNEX A. This appendix contains the procedure sheet for the demonstration on the ATF Chief 29.

00:31 5. INK FOUNTAIN (ATF CHIEF 29 DP)

Demonstration

00:40 6. AUTOMATIC INK CONTROL UNIT
(ATF CHIEF 29 DP)

Demonstration

(QUESTIONS AND COMMENTS PERIOD)

SUMMARY

- 00:47
- 1. Ink Fountain
 - 2. Automatic Ink Control Unit
 - 3. Ink Rollers
 - 4. Method of Setting Inking Assembly
 - 5. Ink Fountain (Demonstration)
 - 6. Automatic Ink Control Unit (Demonstration)
 - 7. Tie-in to Demonstration on ATF Chief 29

00:50 BREAK

INTRODUCTION

01:00 During the last hour the students were shown the ink fountain, automatic ink control unit, ink rollers, and given a demonstration on the ink fountain and automatic ink control unit. During the next half hour the student will be given a demonstration on the method of setting inking assembly.

DEVELOPMENT

01:02 7. METHOD OF SETTING INKING ASSEMBLY
(ATF CHIEF 29 DP)

Demonstration

01:25 8. CRITIQUE

Demonstration

- a. Repose key questions
- b. Clarify any misconceptions

(QUESTIONS AND COMMENTS PERIOD)

SUMMARY

- 01:28 1. Method of Setting Inking Assembly
 2. Ink Rollers
 3. Tie-in to Lecture on Harris LYG Press
- 01:29 Students will return to classroom for lecture on Harris LYG Press

INTRODUCTION

- 01:30 During the last class the student was taught the inking assembly of the "ATF Chief 29." During this class the student will be taught the inking assembly of the "Harris LYG Offset Press." It is very similiar in that it feeds and distributes ink instead of water. It is different in that it has five more rollers than the "ATF Chief 29." Again it is important that you know the number of different rollers, how they function, how to set them properly, as well as their names and composition.

During the demonstration look for the answer to the following questions:

1. In what sequence are the form rollers installed on the Harris LYG Offset Press?
2. How is the fountain roller adjusted to the ductor roller on the Harris LYG Offset Press?
3. Which rollers do the most work in smoothing out the ink on the Harris LYG Offset Press?

DEVELOPMENT

- 01:32 9. INK FOUNTAIN (HARRIS LYG)
- a. Ink fountain
 - b. Fountain roller
 - c. Manual handle
 - d. Fountain blade
 - e. Fountain keys
- 01:36 10. AUTOMATIC INK CONTROL UNIT (HARRIS LYG)
- a. Ink control handle
 - b. Ink control pawl
 - c. Ink control ratchet

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- d. Doctor roller control
- e. Ink motion throw-off handle

01:40 11. INK ROLLERS (HARRIS LMG)

- a. Doctor roller
- b. Intermediate rollers
- c. Rider rollers
- d. Distributor rollers
- e. Vibrator roller
- f. Center roller
- g. Form rollers

01:43 12. METHOD OF SETTING INKING ASSEMBLY (HARRIS LMG)

- a. Accuracy
- b. Adjustment to parallel
- c. Adjustment to the plate
- d. Feeler strips
- e. Ink form rollers

(1) #2 form roller

- (a) Setting the #2 form roller to the vibrator
- (b) Setting the #2 form roller to the plate

(2) #1 form roller

- (a) Setting the #1 form roller to the vibrator
- (b) Setting the #1 form roller to the plate

(3) #3 form roller

- (a) Setting the #3 form roller to the vibrator
- (b) Setting the #3 form roller to the plate

(4) #4 form roller

- (a) Setting the #4 form roller to the vibrator
- (b) Setting the #4 form roller to the plate

- f. Lower rider roller
- g. Intermediate rollers
- h. Removable vibrator roller

- i. Distributor rollers
- j. Upper rider rollers
- k. Doctor roller
- l. Ink fountain roller

(QUESTIONS AND COMMENTS PERIOD)

SUMMARY

- 01:47
1. Ink Fountain
 2. Automatic Ink Control Unit
 3. Ink Rollers
 4. Method of Adjusting Inking Assembly
 5. Tie-in to Demonstration on Harris L&G Offset Press
- 01:50 BREAK

INTRODUCTION

02:00 During the last hour the student had explained to him the inking assembly, the nomenclature, construction, controls, the different rollers and their functions. During the next hour you will see a demonstration on how to adjust the inking assembly. Pay strict attention to the sequence that must be followed in installing and adjusting the rollers. After the demonstration there will be a student practical exercise.

- | | | | |
|---------------|--|---|---------------|
| 02:02 | 13. INK FOUNTAIN (HARRIS L&G) | <table border="1"><tr><td>Demonstration</td></tr></table> | Demonstration |
| Demonstration | | | |
| 02:05 | 14. AUTOMATIC INK CONTROL UNIT (HARRIS L&G) | <table border="1"><tr><td>Demonstration</td></tr></table> | Demonstration |
| Demonstration | | | |
| 02:15 | 15. METHOD OF SETTING INKING ASSEMBLY (HARRIS L&G) | <table border="1"><tr><td>Demonstration</td></tr></table> | Demonstration |
| Demonstration | | | |
| 02:45 | 16. CRITIQUE | <table border="1"><tr><td>Demonstration</td></tr></table> | Demonstration |
| Demonstration | | | |
- a. Repose key questions
 - b. Clarify any misconceptions

(QUESTIONS AND COMMENTS PERIOD)

SUMMARY

- 02:47
1. Ink Fountain
 2. Automatic Ink Control Unit
 3. Ink Rollers
 4. Method of Setting Inking Assembly
 5. Tie-in to Practical Exercise

SECTION III
SOURCE MATERIAL
INKING ASSEMBLY

INTRODUCTION

The inking assembly, consisting of an ink fountain, a ductor roller, vibrator rollers, intermediate rollers, and form rollers, transfers the ink uniformly to the plate as the plate cylinder revolves. This action follows the dampening of the plate. The ink clings to the image portion of the plate and is repelled by the dampened non-printing areas. In order to have a uniformly thin film of ink flow to the image area on the plate, all rollers in the inking assembly must be correctly adjusted.

DEVELOPMENT

1. INK FOUNTAIN (ATF CHIEF 29 DP)

a. Ink fountain. This is a term that describes the parts that hold the ink that is used for printing and consists of several parts, a fountain roller, a fountain blade with keys for adjustment and necessary brackets or holders for attachment to the press. The ink fountain is cleaned when change of ink is required and at the end of each working day. Thorough cleaning will remove paper lint, dried ink, chemicals from the dampening system and other undesirable impurities. A clean ink fountain with clean ink gives a better printed job. The ink fountain is greased weekly.

b. Fountain roller. The fountain roller is a metal roller permanently mounted in the frame of the press. It is not adjustable except for the amount of rotation discussed later on. The roller is kept free of dried ink by washing with solvent when necessary.

c. Manual handle. The manual handle, located on the gear side of the press is used to turn the fountain roller by hand when putting ink into the fountain, making the initial setting for ink distribution and during the wash-up of the press. The manual handle has a pawl attached to the side which engages the ratchet attached to the fountain roller. Care should be taken to fully engage the pawl into the teeth of the ratchet to prevent breaking or undue wear of the ratchet teeth and the pawl. The pawl and the manual handle are oiled at the beginning of each shift and cleaned during press wash-up.

d. Fountain blade. The fountain blade is made of flexible spring steel. Care must be taken so that the blade is not bent

or nicked. The fountain blade is mounted at an angle to the fountain roller to make a trough to hold the ink against the fountain roller. The front edge of the fountain blade is adjustable with the fountain keys, discussed later, to allow a film of ink to pass through a gap between the fountain blade and the fountain roller and adhere to the fountain roller. The back edge of the fountain blade is attached to the press with bolts. The blade must be firmly held in place. Use care and the proper size wrench when tightening or loosening the three bolts holding the fountain blade in place. The fountain blade is removed and cleaned thoroughly at each wash-up. To remove the fountain blade, loosen the three bolts, and pull the fountain blade free from the press.

e. Abutment plate rod assembly. The abutment plate rod assembly is located under the fountain blade and over the fountain keys to prevent the fountain keys from forming dents in the fountain blade and to allow for easier and better adjustment of the ink flow. The abutment plate rod assembly is carefully removed for cleaning at each wash-up. Do not bend or damage the assembly. Replace the assembly after completing the fountain wash-up taking care to see that the abutment plate rod assembly is not bent or twisted and that every fountain key is covered.

f. Fountain keys. There are 25 fountain keys on the ATF Chief 29 (DP) press. When a key is turned clockwise, it causes the fountain blade to move toward the fountain roller, reducing the amount of ink that will flow on to the fountain roller. Counter clockwise will cause the fountain blade to open, causing more ink to flow out. To initially set the ink flow, ink is placed in the fountain, the fountain roller turned by hand with the manual handle and the fountain keys adjusted until the desired ink flow is obtained. Final adjustment is usually made with the press running. The fountain keys are cleaned at each wash-up. If the keys become difficult to turn by hand, they are removed by screwing completely out of the press and cleaned with solvent and a brush or by soaking if necessary. Damaged keys must be replaced. Each key must be backed off sufficiently to clear the fountain blade before the fountain blade is removed for wash-up. If a key is not backed off far enough it might be hit by the fountain blade when the blade is being replaced. This will damage the edge of the blade, causing ink adjustment problems. A part of each fountain key is a calibration disk. The purpose of the disk is to assist in setting the ink flow and to prevent the blade from being forced up against the fountain roller too tight. To adjust, the calibrated disks are first loosened. Then the fountain keys are tightened sufficiently to shut off the ink flow to the fountain roller. The disks are set with the marker on zero and the disks are retightened to the fountain keys. One complete turn of the key counter clockwise from this position is

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usually more than enough to provide ink for use. With the calibration disks properly set, the ink fountain keys cannot be turned in far enough to damage the fountain blade or roller. The fountain keys are adjusted to give a thin to medium film of ink to the fountain roller and the fountain roller adjusted for a long turn. A better, more consistent supply of ink is provided with this type of setting than one where a heavy supply of ink is applied to the fountain roller and the roller adjusted for a short turn.

2. AUTOMATIC INK CONTROL UNIT (ATF CHIEF 29 DP)

This is the unit that causes the ink fountain roller to rotate when the press is in operation and is located on the operator's side of the press. Keep it clean and oil at the beginning of each 8 hour shift or more often if necessary. No tools are necessary for normal adjustment of this unit.

a. Ink control handle. The ink control handle controls the rotation of the ink fountain roller. The handle knob is spring loaded and fits into holes numbered 0 through 10. 0 stops rotation and 10 gives maximum rotation. To adjust, the handle knob is pulled out and the handle moved up or down to the desired position and the handle knob released. The spring will cause the handle knob to move into the selected index hole and remain there. The ink control handle rotates on the ink fountain shaft and the eccentric shape of the ink control handle affects the action of the ink control pawl discussed in the next paragraph.

b. Ink control pawl. The ink control pawl is attached to a casting that rotates on the ink fountain roller shaft. This casting moves in an arc of about 45 degrees each time the press cylinders make one revolution. The ink control pawl rides on the eccentric surface of the ink control handle. When the ink control handle is set on 0 the pawl is completely disengaged and cannot turn the ink fountain roller. The ink control pawl can also be lifted free of the eccentric. As the ink control handle is moved to higher numbers, the ink control pawl is lowered, causing it to engage the teeth on the ink control ratchet discussed in the next paragraph.

c. Ink control ratchet. The ink control ratchet is a gear-like device with sharp teeth designed to catch and hold the ink control pawl. The ink control ratchet is securely fastened to the ink fountain roller. When the press is in operation and on impression, with the ink control handle properly set, the ink control pawl will ride over the eccentric surface of the ink control handle and drop into one of the teeth of the ink control ratchet. The ink control pawl will continue to move and will cause the ink fountain roller to rotate. The amount of rotation is controlled

by the setting of the ink control handle. The teeth of the ink control ratchet must be kept free of ink and dirt to permit proper engagement of the pawl.

d. Ink control lever. The ink control lever causes the ink control pawl to drop into place when the press goes on impression and lifts the pawl up when the press goes "off impression." The upper part of the lever fits loosely around the ink fountain roller shaft. The lower end of the ink control lever fits over a stud on the inside of the ink motion throw-off handle, which is described in the next paragraph. When the press is in operation and on impression the ink control lever is in its lowest position. The ink control pawl moves over the eccentric of the ink control handle and engages the teeth of the ink control ratchet. When the press is operating but not on impression the ink control handle is in its upper most position. The ink control pawl then rides on the ink control lever and cannot engage the teeth of the ink control ratchet. The ink control lever may be operated manually. If it is necessary to stop the rotation of the ink fountain roller for a few revolutions when the press is operating and on impression the lever is lifted. To resume rotation of the ink fountain roller the lever is dropped back into place. During make ready and ink adjustment when the press is operating but not on impression the ink fountain roller can be made to turn automatically by lifting the ink control lever off the stud and lowering the lever. After adjustment, lift the lever back in place to stop the ink fountain rotation. If the lever is down and the press is put on impression, the lever will automatically return to its position on the stud. The main purpose of the ink control lever is to prevent an excessive amount of ink being piled on the rollers from the fountain while the press is in operation but not on impression.

e. Ink motion throw-off handle. The ink motion throw-off handle is used to control the position of the form rollers in relation to the plate. This handle is connected to the impression cylinder linkage arm. The ink motion throw-off handle has three positions, down, up, and lock-up. The handle has a knurled spring loaded cover which has a shoulder on one side. When it is necessary to keep the form rollers up when mounting a plate, the cover is pulled out which disconnects the handle from the impression cylinder linkage. This is known as the lock-up position. While in lock-up position, form rollers can be lowered or raised manually. Rotate cover until shoulder is in up position, this allows the pin to lock handle to impression cylinder linkage. In this position, form rollers will be lowered to plate automatically when the press goes on impression and raised to up position when impression is tripped off.

3. INK ROLLERS (ATF CHIEF 29 DP)

a. Ductor roller. The ductor roller conveys ink from the fountain roller to the rest of the inking assembly rollers by being in contact with the fountain roller part of the time and then arcing over to touch the vibrator the remainder of the time.

b. Intermediate rollers. The intermediate rollers transfer ink from one roller to another. They have their own bearings, do not oscillate, and are friction driven.

c. Rider roller. The rider roller is nonoscillating and not adjustable. It rides on two intermediate rollers and transfers ink.

d. Vibrator rollers. The vibrator rollers do most of the work of smoothing out and distributing the ink evenly to the form rollers. The vibrator rollers move from side to side along their axis as they rotate.

e. Form rollers. During the printing cycle, the form rollers move into contact with the plate and transfer ink to the plate.

4. METHOD OF SETTING INKING ASSEMBLY (ATF CHIEF 29 DP)

a. Accuracy. All adjustments of the ink rollers must be as accurate as possible. A form roller that is set too light on one end will not transfer ink to the plate or may not pick up ink from the vibrator roller. A roller that is set too tight to the plate tends to bounce when hitting the leading edge of the plate causing undue wear on the equipment and may miss part of the image that should be inked. A tight ink roller will also cause the plate image to wear off and can cause scum in the non-printing area by scrubbing ink off onto the non-printing areas.

b. Adjustment to parallel. To operate effectively, all the rollers must be parallel to each other and to the plate. The first adjustment of a roller will be to the vibrator roller.

c. Adjustment to plate. Once a form roller has been adjusted and paralleled with the vibrator roller, the plate adjustment can be made. This adjustment generally will not affect the previous adjustment to the vibrator, but after the plate adjustment has been made, the adjustment between roller and vibrator will be checked and readjusted if necessary. It is good practice to re-check each roller after an adjustment has been made, either to the plate or the vibrator.

d. Feeler strips. A convenient gauge for testing the adjustment of the rollers is a strip of paper about $1\frac{1}{2}$ inches wide, 24 inches long and .003 to .004 inches thick. One strip of paper is placed on each end of the roller being adjusted. The roller is brought into contact with either the vibrator or plate, and the necessary adjustments are made while pulling on the strips of paper to get an even tension on each end of the roller.

e. Ink form rollers. Remove the three intermediate rollers, rider roller, two removable vibrator rollers, number one and three form rollers.

(1) #2 form roller.

(a) Setting to the vibrator.

1. Place the vibrator roller in place and lock down.
2. Adjust with allen screws under roller. This adjustment has no locking device.
3. Check this adjustment with the ink motion throw-off handle in both positions.

(b) Setting to the plate.

1. Adjustment is made with an allen screw which has a locking nut that fits over the screw itself.
2. This adjustment is located at the top of the roller socket. Check adjustment to vibrator and readjust if necessary.

(2) #1 form roller.

(a) Setting to the vibrator.

1. Take out the copper vibrator roller and the #2 form roller.
2. Place in position the #1 form roller and the copper vibrator roller.
3. Make adjustment with allen screw (top rear). This adjustment has no locking device.

Check this adjustment with the ink motion throw-off handle in both positions.

(b) Setting to the plate.

1. Adjustment is an allen screw with a locking nut that fits over the screw itself.
2. This adjustment is located at the top of the roller socket. Check and readjust to vibrator if necessary.
3. Remove the #1 form roller and the copper vibrator.

(3) #3 form roller.

(a) Setting to the vibrator.

1. Replace #3 form roller and vibrator roller.
2. Adjust with allen screws under roller, this adjustment has no locking device.
3. Check this adjustment with the ink motion throw-off handle in both positions.

(b) Setting to the plate.

Same as the other form rollers.

f. Auxiliary vibrator roller. Set the auxiliary vibrator roller to the #3 form roller by means of a thumb screw on each end of the roller.

g. Intermediate rollers. Only two intermediate rollers are adjustable. One is adjustable by varying the spring tension. The other intermediate is adjusted by self locking wing bolts. This is the only one that will be adjusted by the students.

h. Ductor roller.

- (1) The ductor roller is self-parallel.
- (2) Adjust to fountain roller with eccentric stud on operator's side of the press for overall pressure.

- (3) The fountain roller is not adjustable.

NOTE TO INSTRUCTOR:

For recommended step-by-step procedure on para 5, 6 and 7, refer to APPENDIX 1 to ANNEX A this LRF.

8. CRITIQUE

a. Repose key questions.

Q. In what sequence are the form rollers installed on the ATF Chief 29?

A. #2, #1, #3

Q. What adjustment is made first when setting the form rollers on the ATF Chief 29?

A. Adjust to vibrator roller

Q. What is the second adjustment made when setting the form rollers on the ATF Chief 29?

A. Adjust to plate

b. Clarify any misconceptions.

9. INK FOUNTAIN (HARRIS LRG)

a. Ink fountain. This is a term that describes the parts that hold the ink that is used for printing. It consists of several parts, a fountain roller, a fountain blade with keys for adjustment, and necessary brackets or holders for attachment to the press. The ink fountain is cleaned when change of ink is required and at the end of each working day. Thorough cleaning will remove paper lint, dried ink, and chemicals from the dampening system and other undesirable impurities. A clean ink fountain with clean ink gives a better printed job. The ink fountain is greased as often as necessary.

b. Fountain roller. The fountain roller is a metal roller permanently mounted in the frame of the press. It is adjustable for paralling to the ductor and also for the amount of rotation discussed later on. The roller is kept free of dried ink by washing with solvent when necessary.

c. Manual handle. The manual handle, located on the gear side of the press is used to turn the fountain roller by hand when putting ink into the fountain, making the initial setting for ink distribution and during the wash-up of the press. The manual handle has a pawl attached to the side which engages the

ratchet attached to the fountain roller. Care should be taken to fully engage the pawl into the teeth of the ratchet to prevent breaking or undue wear of the ratchet teeth and the pawl. The pawl and the manual handle are oiled at the beginning of each shift and cleaned during press wash-up.

d. Fountain blade. The fountain blade is made of flexible spring steel. Care must be taken that the blade is not bent or nicked. The fountain blade is mounted at an angle to the fountain roller to make a trough to hold the ink against the fountain roller. The front edge of the fountain blade is adjustable with the fountain keys, discussed later, to allow a film of ink to pass through a gap between the fountain blade and the fountain roller and adhere to the fountain roller. In operating position the back edge of the fountain blade is attached to the press with bolts. The blade must be firmly held in place. Use care and proper size wrench when tightening or loosening the four bolts holding the fountain blade in place. The fountain blade swings down and away from the fountain roller and is cleaned thoroughly at each wash-up. To swing the fountain blade out for cleaning, loosen the four bolts and pull down and away on fountain keys.

e. Fountain keys. There are 23 fountain keys on the LXG press. Before locking fountain blade in operating position, care must be taken that all fountain keys are turned back out of contact with the fountain blade. Keys turned in with excess pressure on blade can damage (bend blade) when locking fountain blade assembly in operating position. Before placing ink in fountain, turn fountain keys clockwise until there is a light contact between fountain blade and the fountain roller. Turning keys clockwise moves the fountain blade toward the fountain roller, reducing the amount of ink that will flow on to the fountain roller. Counter clockwise will cause the fountain blade to open, causing more ink to flow out. To initially set the ink flow, ink is placed in the fountain, the fountain roller turned by hand with the manual handle and the fountain keys adjusted until the desired ink flow is obtained. Final adjustment is usually made with the press running.

The fountain keys are adjusted to give a thin to medium film of ink to the fountain roller and the fountain roller is adjusted for a long turn. A better, more consistent supply of ink is provided with this type of setting than one where a heavy supply of ink is applied to the fountain roller and the roller adjusted for a short turn. The fountain keys are cleaned at each wash-up. If the keys become difficult to turn by hand, they are removed by screwing completely out of the fountain blade assembly and cleaned with solvent and oiled before replacing in the assembly. Damaged keys must be replaced.

1. AUTOMATIC INK CONTROL UNIT (HARRIS LMG)

This is the unit that causes the ink fountain roller to rotate and operates the ductor roller when the press is operating. It is located on the operator's side of the press. It should be kept clean and oiled at the beginning of each 8 hour shift or more often if necessary. No tools are necessary for normal adjustment of this unit.

a. Ink control handle. The ink control handle controls the rotation of the ink fountain roller. The handle is spring loaded and fits into notches. With the handle in the down position in a single notch, rotation is stopped. Starting one-half inch up from the single notch are a series of notches which give a minimum to a maximum rotation of the ink fountain roller.

b. Ink control pawl. The ink control pawl is attached to a casting that rotates on the ink fountain roller shaft. This casting moves in an arc of about 45 degrees each time the press cylinder makes one revolution. The ink control pawl rides on the eccentric surface of the ink control handle. When the ink control handle is set in the single notch, the pawl is completely disengaged and cannot turn the fountain roller. As the ink control handle is moved into the series of notches the ink pawl is lowered, causing it to engage the teeth on the ink control ratchet.

c. Ink control ratchet. The ink control ratchet is a gear-like device with sharp teeth designed to catch and hold the ink control pawl. The ink control ratchet is securely fastened to the ink fountain roller shaft. When the press is in operation with the ink control handle properly set, the ink control pawl will ride over the eccentric surface of the ink control handle and drop into the teeth of the ink control ratchet. The ink control will continue to move and will cause the ink fountain roller to rotate. The amount of rotation is controlled by the setting of the ink control handle. The teeth of the ink control ratchet must be kept free of engagement of the pawl.

d. Ductor roller control. The ductor roller control is a T/handle located immediately above the ink motion throw-off handle. The ductor roller has three operating positions.

(1) For continuous operation, push the T/handle up and turn clockwise until locked. In this position, the ductor will operate continuously with the press either on or off impression. Continuous operation position is used only to initially ink up rollers before actual printing begins.

(2) For automatic operation, turn T/handle counter clockwise to unlock and the spring will position T/handle for automatic operation. In this position, the ductor will operate automatically when the press is on impression and will stop operation when impression is tripped off.

(3) To stop the ductor from operating, pull the T/handle down to engage latch and turn the T/handle clockwise until locked. In this position, the ductor is locked out of operation with the press either on or off impression.

e. Ink motion throw-off handle. The ink motion throw-off handle is used to control the position of the form rollers in relation to the plate. This handle is connected to the impression cylinder linkage arm. The ink motion throw-off handle has three positions, down, up, and lock-up. The handle is spring loaded and has a pin in one side. When it is necessary to keep the form rollers up when mounting a plate, the handle is pulled out of the slide which disconnects the handle from the impression cylinder linkage. Rotate the handle one quarter turn to lock in this position. This is known as the lock up position. While in lock-up position, form rollers can be lowerer or raised manually. Rotate handle until the pin rides in the slot on the slide and this allows the handle to lock to the impression cylinder linkage. In this position, form rollers will be raised and lowered automatically when press goes on and off impression.

11. INK ROLLERS (HARRIS LIX)

a. Ductor roller. The ductor roller conveys ink from the fountain roller to the rest of the inking assembly rollers by being in contact with the fountain roller part of the time and then arcing over to touch the vibrator the remainder of the time.

b. Intermediate rollers. The intermediate rollers transfer ink from one roller to another. They have their own bearings, do not oscillate, and are friction driven.

c. Rider rollers. The rider rollers are non-oscillating and not adjustable. They ride on top of the distributor rollers and on #2 and #3 form rollers.

d. Distributor rollers. The distributor rollers ride on the upper three vibrator rollers. They transfer ink and are an aid to the vibrator rollers in smoothing out the ink.

e. Vibrator rollers. The vibrator rollers do most of the work of smoothing out and distributing the ink evenly to the form rollers. The vibrator rollers move from side to side along their axis as they rotate.

f. Center roller. The center roller is friction driven and transfers ink between the intermediate rollers.

g. Form rollers. During the printing cycle the form rollers move into contact with the plate and transfer ink to the plate.

12. METHOD OF SETTING INKING ASSEMBLY (HARRIS LKG)

a. Accuracy. All adjustments of the ink rollers must be as accurate as possible. A form roller that is set too light on one end will not transfer ink to the plate or may not pick up ink from the vibrator roller. A roller that is set too tight to the plate tends to bounce when hitting the leading edge of the plate causing undue wear on the equipment and may miss part of the image that should be inked. A tight ink roller will also cause the plate image to wear off and can cause scum in the non-printing area by scrubbing ink off on to the non-printing areas.

b. Adjustment to parallel. To operate effectively, all the rollers must be parallel to each other and to the plate. The first adjustment of a roller will be to the vibrator roller.

c. Adjustment to the plate. Once a form roller has been adjusted to be parallel with the vibrator roller, the plate adjustment can be made. This adjustment generally will not effect the previous adjustment to the vibrator, but after the plate adjustment has been made, the adjustment between the form roller and vibrator will be checked and readjusted if necessary. It is good practice to recheck each roller after an adjustment has been made, either to the plate or the vibrator.

d. Feeler strips. A convenient gauge for testing the adjustment of the rollers is a strip of paper about $1\frac{1}{2}$ inches wide and 24 inches long and .003 to .004 inches thick. One strip of paper is placed on each end of the roller being adjusted. The roller is brought into contact with either the vibrator or plate and the necessary adjustments are made while pulling on the strips of paper to get an even tension on each end of the roller.

e. Ink form rollers.

(1) #2 form roller.

(a) Setting the #2 form roller to the vibrator.

1. Remove the three rider rollers, two distributor rollers, the removable vibrator roller, four intermediate rollers, the ductor roller, the number one, three

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and four form rollers.

2. Loosen the eccentric lock screws, both ends of roller.
3. Turn screw in bearing shaft (operators side) in counter clockwise direction, turn screw in bearing shaft (far side) in clockwise direction. Adjust to a light tension. (Tighten lock screws)

(b) Setting the #2 form roller to the plate.

1. Lower the form rollers to the plate.
2. Loosen the lock screws on the roller bracket.
3. Turn the adjusting screws counter clockwise to increase pressure to the plate, clockwise to decrease pressure to plate. Adjust to a very light tension. (Tighten lock screws)

(2) #1 form roller.

(a) Setting the #1 form roller to the vibrator.

1. Remove the #2 form roller by loosening the pipe plug screw in the bearing shaft and move bearing and shaft out of contact with the form roller.
2. Place in position the #1 form roller and insert bearing in the end of the form roller. Care should be taken that all end play is removed. (Tighten pipe plug screw in bearing shaft)
3. Loosen the eccentric lock screws, both ends of roller.
4. Turn screw in bearing shaft (operator's side) in counter clockwise direction, turn screw in bearing shaft (far side) in clockwise direction. Adjust to a light tension. (Tighten lock screws)

(b) Setting the #1 form roller to the plate.

1. Lower the form rollers to the plate.
2. Loosen the lock screws on the roller brackets.
3. Turn the adjusting screws counter clockwise to increase pressure to the plate, clockwise to decrease pressure to the plate. Adjust to a very light tension. (Tighten lock screws.)

(3) #3 form roller.

(a) Setting the #3 form roller to the vibrator.

1. Remove the #1 form roller by loosening the pipe plug screw in the bearing shaft and move bearing and shaft out of contact with the form roller.
2. Place in position the #3 form roller and insert bearing in the end of the form roller. Care should be taken that all end play is removed. (Tighten pipe plug screw in bearing shaft.)
3. Loosen the eccentric lock screws, both ends of roller.
4. Turn screw in bearing shaft (operator's side) in clockwise direction, turn screw in bearing shaft (far side) in counter clockwise direction. Adjust to a light tension. (Tighten lock screws)

(b) Setting the #3 form roller to the plate.

1. Lower the form rollers to the plate.
2. Loosen the lock screws on the roller brackets.
3. Turn the adjusting screws counter clockwise to increase pressure to the plate, clockwise to decrease pressure to the plate. Adjust to a very light tension. (Tighten lock screws.)

(4) #4 form roller.

(a) Setting the #4 form roller to the vibrator.

1. Remove the #3 form roller by loosening the pipe plug screw in the bearing shaft and move bearing and shaft out of contact with the form roller.
2. Place in position the #4 form roller and insert bearing in the end of the form roller. Care should be taken that all end play is removed. (Tighten pipe plug screw in bearing shaft)
3. Loosen the eccentric lock screws, both ends of roller.
4. Turn screw in bearing shaft (operators side) in a clockwise direction, turn screw in bearing shaft (far side) in a counter clockwise direction. Adjust to a light tension. (Tighten lock screws)

(b) Setting the #4 form roller to the plate.

1. Lower the form rollers to the plate.
2. Loosen the lock screws on the roller brackets.
3. Turn the adjusting screws counter clockwise to increase pressure to the plate, clockwise to decrease pressure to the plate. Adjust to a light even tension. (Tighten lock screws)
4. Re-install #1, #2, #3 form rollers being careful not to change rollers end for end. (Tighten pipe plug screws in bearing shafts.)

f. Lower rider roller.

- (1) Install the lower rider roller through frame of press from operator's side.
- (2) Move the roller bracket into position over end of roller but do not tighten.

- (3) Loosen roller bracket on far side of press and allow the rider roller to seat itself evenly on #2 and #3 form rollers.
- (4) Tighten brackets to hold the rider roller in this position.

g. Intermediate rollers.

- (1) Place in position the four intermediate rollers.
- (2) Do not lock intermediate rollers in press at this time.

h. Removable vibrator roller.

- (1) Place in position the removable vibrator roller. Be sure the flats on the bushings are properly positioned on the inker frame and the gear teeth are properly meshed. If gear teeth do not mesh fully, turn press by hand to allow rollers to seat properly.
- (2) Using the special "T" wrench, turn roller locking assembly counter clockwise to on position. This locks in the intermediate rollers. Remember, removable vibrator roller must have been installed before locking in the intermediate rollers, no adjustment is necessary.

i. Distributor rollers.

- (1) Place the distributor rollers in the slotted bearing brackets on top of inker frame.
- (2) No adjustment is necessary.

j. Upper rider rollers.

- (1) Place the rider rollers in slotted bearing brackets on top of the distributor rollers.
- (2) Place cotter pin through top of bearing brackets to hold the rollers in place.
- (3) No adjustment is necessary.

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k. Ductor roller.

- (1) Place the ductor roller in position, fitting the end of roller on the eccentric bearing, (far side of press). Place the eccentric bearing (operator's side) in position, being sure to remove any end play. (Tighten lock screw.)
- (2) Turn the press by hand until the ductor roller cam has reached its highest position.
- (3) Loosen the eccentric lock screw, (operator's side), place T/handle allen wrench in the end of bearing shaft, turn clockwise to increase pressure and counter clockwise to decrease pressure. Loosen the eccentric lock screw far side of press, turn counter clockwise to increase pressure, clockwise, to decrease pressure. Adjust to an even tension on both ends of roller. (Tighten lock screws.)

l. Ink fountain roller.

- (1) Loosen cap screws on top outside ends of ink fountain frame. Move entire frame back away from ductor roller, being careful to move both ends at same time.
- (2) Lock ductor control in continuous operation.
- (3) Turn the press by hand until the ductor roller cam is on low dwell.
- (4) Move the fountain toward the ductor roller, being careful to move both ends at the same time. Adjust to an even tension on both ends. Then lock the cap screws.

NOTE TO INSTRUCTOR:

For recommended step-by-step procedure on para 13, 14 and 15 refer to APPENDIX 2 to ANNEX A this LRF.

16. CRITIQUE

a. Repose key questions.

- Q. In what sequence are the form rollers installed on the Harris LXG Offset Press?
- A. #2, #1, #3 & #4.

- Q. How is the fountain roller adjusted to the ductor roller on the Harris LXG Offset Press?
- A. The cap screws are loosened and the entire ink fountain frame is backed away. (Be careful to move both ends at the same time). The ink ductor control is locked for continuous operation. Set the ductor roller cam on low dwell. Then move the ink fountain toward the ductor until you get an even tension on both ends of the ductor roller. When this is accomplished lock the cap screws.
- Q. Which rollers do the most work in smoothing out the ink on the Harris LXG Offset Press?
- A. Vibrator rollers.
- b. Clarify any misconceptions.

SUMMARY

Today you were shown the inking assemblies of the "ATF Chief 29" and the "Harris LXG" offset presses. You were given the nomenclature, construction, controls, the different rollers and their function and finally given a demonstration on how to set each of the ink rollers. Although the inking assemblies may appear to consist of many parts it is really quite simple to learn. With what you have seen today and a little practice you should have no trouble adjusting the inking assembly in the PE that is to follow.

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STUDENT ADVANCE SHEET

SUBJECT: Offset Press Operation

LESSON: Inking Assembly

OBJECTIVES: The purpose of this phase of the instruction in the inking assembly is to provide you with a qualified knowledge in the operation and adjustment of the inking assembly and the safety precautions that apply.

STUDY REFERENCES: The following reading assignment will be accomplished prior to the first period of instruction:

1. TM 5-245 (Sep 62), Map Reproduction, para 83-85.
2. TM 5-3610-202-15 (Mar 63), Operator, Organizational, Field & Depot Maintenance Manual, para 1-56 thru 1-68, para 2-12 thru 2-15, 2-103 thru 2-106, para 3-27 thru 3-31.
3. Harris LXG Manufacturer's Manual, para 84-97.

SUPPLEMENTARY INFORMATION: Instruction in the inking assembly will be accomplished in the following sequence:

1. Lecture and discussion (1 hour). Includes:
 - a. Ink fountain
 - b. Automatic ink control unit
 - c. Ink rollers
 - d. Method of setting inking assembly
2. Demonstration (2 hours). Designed to provide the student with a working knowledge of the operation and adjustments of the inking assembly. (See APPENDIX 1 to ANNEX A for procedure sheet).
3. Practical exercise (20 hours). The objective of this exercise is to provide the student with a qualified knowledge of the operation and adjustment of the inking assembly.

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ANNEX A
T.440-112 (3-69)

RECOMMENDED PROCEDURE

The following guide and step-by-step procedure will be used during the demonstration.

All parts of the inking assembly of the (ATF Chief 29) will be pointed out and explained thoroughly to the students.

1. INK FOUNTAIN (ATF CHIEF 29)

- a. Ink fountain
- b. Fountain roller
- c. Manual handle
- d. Fountain blade
- e. Abutment plate rod assembly
- f. Fountain keys

2. AUTOMATIC INK CONTROL UNIT (ATF CHIEF 29)

- a. Ink control handle
- b. Ink control pawl
- c. Ink control ratchet
- d. Ductor roller control
- e. Ink motion throw off handle

3. METHOD OF SETTING INKING ASSEMBLY (ATF CHIEF 29)

a. Accuracy. All adjustments of the ink rollers must be as accurate as possible. A form roller that is set too light on one end will not transfer ink to the plate or may not pick up ink from the vibrator roller. A roller that is set too tight to the plate tends to bounce when hitting the leading edge of the plate causing undue wear on the equipment and may miss part of the image that should be inked. A tight ink roller will also cause the plate image to wear off and can cause scum in the non-printing area by scrubbing ink off onto the non-printing areas.

b. Adjustment to parallel. To operate effectively, all the rollers must be parallel to each other and to the plate. The first adjustment of a roller will be to the vibrator roller.

c. Adjustment to plate. Once a form roller has been adjusted and paralleled with the vibrator roller, the plate adjustment can be made. This adjustment generally will not affect the previous adjustment to the vibrator, but after the plate adjustment has been made, the adjustment between roller and vibrator will be checked and readjusted if necessary. It is good practice to re-check each roller after an adjustment has been made, either to the plate or the vibrator.

APPENDIX 1 to ANNEX A
T.440-112 (3-69)

d. Feeler strips. A convenient gauge for testing the adjustment of the rollers is a strip of paper about $1\frac{1}{2}$ inches wide, 24 inches long and .003 to .004 inches thick. One strip of paper is placed on each end of the roller being adjusted. The roller is brought into contact with either the vibrator or plate, and the necessary adjustments are made while pulling on the strips of paper to get an even tension on each end of the roller.

e. Ink form rollers (ATF Chief 29 DP). Remove the three intermediate rollers, rider roller, two removable vibrator rollers, number one and three form rollers.

(1) #2 form roller.

(a) Setting the #2 form roller to the vibrator roller.

1. Place the vibrator roller in place and lock down.
2. Adjust with allen screws under roller. This adjustment has no locking device.
3. Check this adjustment with the ink motion throw-off handle in both positions.

(b) Setting the #2 form roller to the plate.

1. Adjustment is made with an allen screw which has a locking nut that fits over the screw itself.
2. This adjustment is located at the top of the roller socket. Check adjustment to vibrator and readjust if necessary.

(2) #1 form roller.

(a) Setting the #1 form roller to the vibrator roller.

1. Take out the copper vibrator roller and the #2 form roller.
2. Place in position the #1 form roller and the copper vibrator roller.

3. Make adjustment with allen screw (top rear). This adjustment has no locking device. Check this adjustment with the ink motion throw-off handle in both positions.

(b) Setting the #1 form roller to the plate.

1. Adjustment is an allen screw with a locking nut that fits over the screw itself.
2. This adjustment is located at the top of the roller socket. Check and readjust to vibrator if necessary.
3. Remove the #1 form roller and the copper vibrator.

(3) #3 form roller.

(a) Setting the #3 form roller to the chrome vibrator roller.

1. Replace #3 form roller and vibrator roller.
2. Adjust with allen screws under roller, this adjustment has no locking device.
3. Check this adjustment with the ink motion throw-off handle in both positions.

(b) Setting the #3 form roller to the plate.

Same as the other form rollers.

f. Setting the auxiliary vibrator roller. Set the auxiliary vibrator roller to the #3 form roller by means of a thumb screw on each end of the roller.

g. Setting the intermediate rollers. Only two intermediate rollers are adjustable. One is adjustable by varying the spring tension. The other intermediate is adjusted by self-locking wing bolts. This is the only one that will be adjusted by the students.

h. Setting the ductor roller.

- (1) The ductor roller is self-parallel.
- (2) Adjust to fountain roller with eccentric stud on operator's side of the press for overall pressure.
- (3) The fountain roller is not adjustable.

RECOMMENDED PROCEDURE

The following guide and step-by-step procedure will be used during the demonstration.

All parts of the inking assembly of the Harris LKG Offset Press will be pointed out and explained thoroughly to the students.

1. INK FOUNTAIN (HARRIS LKG)

- a. Ink fountain
- b. Fountain roller
- c. Manual handle
- d. Fountain blade
- e. Fountain keys

2. AUTOMATIC INK CONTROL UNIT (HARRIS LKG)

- a. Ink control handle
- b. Ink control pawl
- c. Ink control ratchet
- d. Doctor roller control
- e. Ink motion throw off handle

3. METHOD OF SETTING INKING ASSEMBLY

a. Accuracy. All adjustments of the ink rollers must be as accurate as possible. A form roller that is set too light on one end will not transfer ink to the plate or may not pick up ink from the vibrator roller. A roller that is set too tight to the plate tends to bounce when hitting the leading edge of the plate causing undue wear on the equipment and may miss part of the image that should be inked. A tight ink roller will also cause the plate image to wear off and can cause scum in the non-printing area by scrubbing ink off on to the non-printing areas.

b. Adjustment to parallel. To operate effectively, all the rollers must be parallel to each other and to the plate. The first adjustment of a roller will be to the vibrator roller.

c. Adjustment to the plate. Once a form roller has been adjusted to be parallel with the vibrator roller, the plate adjustment can be made. This adjustment generally will not effect the previous adjustment to the vibrator, but after the plate adjustment has been made, the adjustment between the form roller and vibrator will be checked and readjusted if necessary. It is good practice to recheck each roller after an adjustment has been made, either to the plate or the vibrator.

APPENDIX 1 to ANNEX A
T.440-112 (3-69)

d. Feeler strips. A convenient gauge for testing the adjustment of the rollers is a strip of paper about $1\frac{1}{2}$ inches wide and 24 inches long and .003 to .004 inches thick. One strip of paper is placed on each end of the roller being adjusted. The roller is brought into contact with either the vibrator or plate and the necessary adjustments are made while pulling on the strips of paper to get an even tension on each end of the roller.

e. Ink form rollers.

(1) #2 form roller.

(a) Adjusting the #2 form roller to the vibrator.

1. Remove the three rider rollers, two distributor rollers, the removable vibrator roller, four intermediate rollers, the ductor roller, the number one, three and four form rollers.
2. Loosen the eccentric lock screws, both ends of roller.
3. Turn screw in bearing shaft (operator's side) in counter clockwise direction, turn screw in bearing shaft (far side) in clockwise direction. Adjust to a light tension. (Tighten lock screws)

(b) Adjusting the #2 form roller to the plate.

1. Lower the form rollers to the plate.
2. Loosen the lock screws on the roller bracket.
3. Turn the adjusting screws counter clockwise to increase pressure to the plate, clockwise to decrease pressure to plate. Adjust to a very light tension. (Tighten lock screws)

(2) #1 form roller.

(a) Adjusting the #1 form roller to the vibrator.

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1. Remove the #2 form roller by loosening the pipe plug screw in the bearing shaft and move bearing and shaft out of contact with the form roller.
2. Place in position the #1 form roller and insert bearing in the end of the form roller. Care should be taken that all end play is removed. (Tighten pipe plug screw in bearing shaft.)
3. Loosen the eccentric lock screws, both ends of roller.
4. Turn screw in bearing shaft (operator's side) in counter clockwise direction, turn screw in bearing shaft (far side) in clockwise direction. Adjust to a light tension. (Tighten lock screws.)

(b) Adjusting the #1 form roller to the plate.

1. Lower the form rollers to the plate.
2. Loosen the lock screws on the roller brackets.
3. Turn the adjusting screws counter clockwise to increase pressure to the plate, clockwise to decrease pressure to the plate. Adjust to a very light tension. (Tighten lock screws.)

(3) #3 form roller.

(a) Adjusting the #3 form roller to the vibrator.

1. Remove the #2 form roller by loosening the pipe plug screw in the bearing shaft and move bearing and shaft out of contact with the form roller.
2. Place in position the #3 form roller and insert bearing in the end of the form roller. Care should be taken that all end play is removed. (Tighten pipe plug screw in bearing shaft.)
3. Loosen the eccentric lock screws, both ends of roller.

4. Turn screw in bearing shaft (operator's side) in clockwise direction, turn screw in bearing shaft (far side) in counter clockwise direction. Adjust to a light tension. (Tighten lock screws)

(b) Adjusting the #3 form roller to the plate.

1. Lower the form rollers to the plate.
2. Loosen the lock screws on the roller brackets.
3. Turn the adjusting screws counter clockwise to increase pressure to the plate, clockwise to decrease pressure to the plate. Adjust to a very light tension. (Tighten lock screws)

(4) #4 form roller.

(a) Adjusting the #4 form roller to the vibrator.

1. Remove the #3 form roller by loosening the pipe plug screw in the bearing shaft and move bearing and shaft out of contact with the form roller.
2. Place in position the #4 form roller and insert bearing in the end of the form roller. Care should be taken that all end play is removed. (Tighten pipe plug screw in bearing shaft)
3. Loosen the eccentric lock screws, both ends of roller.
4. Turn screw in bearing shaft (operator's side) in a clockwise direction, turn screw in bearing shaft (far side) in a counter clockwise direction. Adjust to a light tension. (Tighten lock screws)

(b) Adjusting the #4 form roller to the plate.

1. Lower the form rollers to the plate.
2. Loosen the lock screws on the roller brackets.

3. Turn the adjusting screws counter clockwise to increase pressure to the plate, clockwise to decrease pressure to the plate. Adjust to a light even tension. (Tighten lock screws)
4. Re-install #1, #2, #3 form rollers being careful not to change rollers end for end. (Tighten pipe plug screws in bearing shafts)

f. Lower rider roller.

- (1) Install the lower rider roller through frame of press from operator's side.
- (2) Move the roller bracket into position over end of roller but do not tighten.
- (3) Loosen roller bracket on far side of press and allow the rider roller to seat itself evenly on #2 and #3 form rollers.
- (4) Tighten brackets to hold the rider roller in this position.

g. Intermediate rollers.

- (1) Place in position the four intermediate rollers.
- (2) Do not lock intermediate rollers in press at this time.

h. Removable vibrator roller.

- (1) Place in position the removable vibrator roller. Be sure the flats on the bushings are properly positioned on the inker frame and the gear teeth are properly meshed. If gear teeth do not mesh fully, turn press by hand to allow rollers to seat properly.
- (2) Using the special "T" wrench, turn roller locking assembly counter clockwise to on position. This locks in the intermediate rollers. Remember, removable vibrator roller must have been installed before locking in the intermediate rollers, no adjustment is necessary.

1. Distributor rollers.

- (1) Place the distributor rollers in the slotted bearing brackets top of inker frame.
- (2) No adjustment is necessary.

j. Upper rider rollers.

- (1) Place the rider rollers in slotted bearing brackets on top of the distributor rollers.
- (2) Place cotter pin through top of bearing brackets to hold the rollers in place.
- (3) No adjustment is necessary.

k. Ductor roller. (Harris LMG)

- (1) Place the ductor roller in position, fitting the end of roller on the eccentric bearing, (far side of press). Place the eccentric bearing (operators side) in position, being sure to remove any end play. (Tighten lock screw)
- (2) Turn the press by hand until the ductor roller cam has reached its highest position.
- (3) Loosen the eccentric lock screw, (operator's side), place T/handle allen wrench in the end of bearing shaft, turn clockwise to increase pressure and counter clockwise to decrease pressure. Loosen the eccentric lock screw far side of press, turn counter clockwise to increase pressure, clockwise to decrease pressure. Adjust to an even tension on both ends of roller. (Tighten lock screws)

l. Ink fountain roller. (Harris LMG)

- (1) Loosen cap screws on top outside ends of ink fountain frame. Move entire frame back away from ductor roller, being careful to move both ends at same time.
- (2) Lock ductor control in continuous operation.
- (3) Turn the press by hand until the ductor roller cam is on low dwell.

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- (4) Move the fountain toward the ductor roller, being careful to move both ends at the same time. Adjust to an even tension on both ends. Then lock the cap screws.

STUDENT PRACTICAL EXERCISE

SUBJECT: Offset Press

LESSON: Inking Assembly

OBJECTIVE(S): To raise the students level of knowledge of procedures and application of the operation and adjustment of the inking assembly from a working knowledge level to a qualified level.

NOTE TO INSTRUCTOR:

Assign students into groups of two per press.

MATERIALS AND SUPPLIES REQUIRED:

Paper strips 1 3/4" x ".003" thick

EQUIPMENT:

1. Press
2. Tools
 - a. Open-end wrench (7/16")
 - b. Allen wrench (3/8")

FACILITIES REQUIRED: Pressroom

TRANSPORTATION REQUIREMENTS: None

ADDITIONAL PERSONNEL:

One assistant instructor for each two presses.

STUDENT REQUIREMENTS:

1. Students will have 20 hours to install ink rollers and make adjustments.
2. Notes:

Each student will be provided an opportunity to make all roller adjustment in the inking assembly.

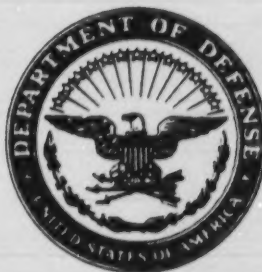
ANNEX C

T.440-112 (3 69)

LESSON PLAN

PREPARE PRESS FOR OPERATION
740-303-B-010-010

OFFSET PRINTING



October 1974

DEFENSE MAPPING SCHOOL — FORT BELVOIR, VIRGINIA

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740-303-B-010-010

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ORIENTATION SHEETSEGMENTS

Press Fundamentals
(104 Hours)

PRESS OPERATING
PROCEDURES
(172 Hours)

BLOCKS

MAKE-READY AND
OPERATIONAL
PROCEDURES
(37 Hours)

LESSONS

PREPARE PRESS FOR
OPERATION (4 Hours)

Practice Printing I
(32 Hours)

Identify Printing
Problems (1 Hour)

Three Color Map
Exercise (48 Hours)

Five Color Map
Exercise (64 Hours)

Miscellaneous Printing
(23 Hours)

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LESSON REQUIREMENTS SHEET

COURSE: Offset Printing

LESSON: Prepare Press for Operation

OBJECTIVE: To demonstrate to the student the procedures he will use to prepare the offset press for operation, using the procedures the student learned in the Control, Feeder and Delivery, Cylinder, Dampening and Inking Assemblies. The instructor will demonstrate how these assemblies are prepared in the Preparation of the Press for Operation. The student will be shown how to properly mix ink, and learn the make-ready procedures he must follow to produce a printed sheet. He will also learn the proper procedure to wash-up the offset press prior to the completion of this lesson. (At the end of this lesson the student will know the procedures, in order to set up and operate the offset press and produce a quality printed sheet in the next lesson Practice Printing I).

TIME: 4 Hours: 1C, 3D

TRAINING AIDS AND DEVICES:

1. Audio-Visual Aids or Devices: None
2. DA Training Aids: None
3. Service Training Aids: None

MATERIALS AND SUPPLIES:

- | | |
|----------------------------------|----------------------|
| 1. Ink w/ink knife & mixing slab | One per press |
| 2. Gum arabic | One bottle per press |
| 3. Plate etch | One bottle per press |
| 4. Ink solvent | One can per press |
| 5. Sponges | Two per press |
| 6. Rags | As required |
| 7. Bucket/water | One per press |
| 8. Map stock | As required |

EQUIPMENT: None

TRAINING AREA:

Indoor: 1. 36-man classroom equipped with desks, chairs and chalkboard.

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2. Pressroom equipped with one offset press and workbench with tool set for each group of designated students.

Outdoor: None

TRANSPORTATION REQUIREMENTS: None

ADDITIONAL PERSONNEL AND DEMONSTRATION TROOPS:

1. Assistant Instructors:

- a. Demonstration: One assistant instructor per designated group.
- b. Practical Exercise: Six assistant instructors.

TEXT REFERENCES:

1. Instructor References: TM 5-245 (7-70), Offset Photolithography and Map Reproduction, Chap 8, Sec VI, para 8-20; Sec VIII, paragraphs 8-25, 8-26; Sec IX, paragraphs 8-27, 8-28; Sec X, paragraphs 8-29, 8-30.

TM 5-3610-202-15, Operator, Organizational, Field and Depot Maintenance Manual, Chap 2, Sec I, paragraphs 2-15, 2-21, 2-22, 2-63, 2-64, 2-65, 2-66.

Harris Operators Manual, Sec XIV, paragraphs 118-119.

2. Student References: TM 5-245 (7-70), Offset Photolithography and Map Reproduction, Chap 8, Sec VI, para 8-20; Sec VIII, paragraphs 8-25, 8-26; Sec IX, paragraphs 8-27, 8-28; Sec X, paragraphs 8-29, 8-30.

Harris Operators Manual, Sec XIV, paragraphs 118-119.

3. Average Student Homework Time: 2 Hours

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740-303-B-010-010

LESSON OUTLINE

LESSON: Prepare Press for Operation

TIME	SUBJECT MATTER OUTLINE	INSTRUCTIONAL TACTICS
	<u>INTRODUCTION</u>	
00:00	During the last lesson, INKING ASSEMBLY, you installed and adjusted the various ink rollers, and operated the inking assembly controls. Now that you have completed the major assemblies of the offset press you are just about ready to begin your practice printing exercises. In this lesson, PREPARATION OF PRESS FOR OPERATION, we will take the preceding lessons on Control, Feeder and Delivery, Dampening, Inking and Cylinder Assembly and present them in one lesson. It is necessary that you thoroughly understand the main assemblies prior to the operation of the press. You will be shown the proper procedure in the preparing the ink, mixing the fountain solution, twisting the plate or swinging the plate cylinder to correctly position the image on the sheet. You will learn the proper adjustment of the side guide and the proper way to place register marks on the plate, printing of the sheet and during this demonstration you will be instructed in the proper procedure for checking the printed sheets for register, color conformity and uniformity. At the completion of the press run you will be instructed in the proper procedures to wash-up the press. All of the procedures you will see in this demonstration will be practiced in your daily operation of the offset press. Remember, ALL SAFETY PROCEDURES	

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TIME	SUBJECT MATTER OUTLINE	INSTRUCTIONAL TACTICS
00:50	3. SET UP FEEDER AND DELIVERY a. Loading of stock b. Sheet transporting devices c. Delivery joggers	While demonstrating review procedures for set up of CFD assembly. Ask questions to check student understanding.
01:30	4. CYLINDER ASSEMBLY a. Install blanket b. Install plate (1) Clean plate (2) Measure image a. 1:1 image b. Measure for twist (3) Prepare clamp for twist	While demonstrating, review procedures of installing plate and blanket. Demonstrate and explain how to clean plate and measure image on plate prior to mounting. Explain how to prepare clamp if image on plate is not parallel to its edge. Ask questions to check student understanding.
		BREAK AT INSTRUCTOR'S DISCRETION
01:50	5. DAMPENING ASSEMBLY a. Check roller adjustments (1) Vibrator adjustment (2) Roller adjustment-locked b. Mix fountain solution c. Ph factor d. Pre-dampening rollers (1) Idling method (2) Sponge method e. Check form to plate method	Demonstrate and explain importance of checking form rollers to vibrator adjustment, and the locking of all roller adjustments. Demonstrate mixing solution, $\frac{1}{2}$ oz. gum, $\frac{1}{2}$ oz. etch to 1 gal. of water. Explain Ph factor. Demonstrate how to idle press to dampen rollers. Demonstrate how to apply solution to dampner roller with sponge, <u>Stress Safety</u> with this method.

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TIME	SUBJECT MATTER OUTLINE	INSTRUCTIONAL TACTICS
02:30	6. <u>INKING ASSEMBLY</u> a. Prepare ink fountain assembly (1) Blade (2) Keys b. Preparation of ink c. Place ink in fountain d. Adjust ink fountain keys e. Ink-up press f. Check ink bead g. Inking plate	Demonstrate how to check dampner form rollers to plate when wet, with <u>heart-beat method</u>. Ask questions to check student understanding. Demonstrate installation of fountain blade and preliminary setting of keys. Demonstrate mixing ink on slab and transporting of ink to fountain. Demonstrate, using ink fountain handle, how to adjust fountain keys. Demonstrate how to drop form roller on plate and checking for proper 1/8" to 3/16" bead on plate. Demonstrate how to wash plate and ink image prior to running sheets. Ask questions to check student understanding.
02:50	7. <u>PRINTING FIRST SHEETS</u> a. Run three (3) sheets b. Position of image (1) 1:1 image (2) Twist (3) Swing (4) Side guide c. Registration marks d. Check register	Demonstrate how to check for correct image position on sheet. Demonstrate twist procedures. Demonstrate swing procedures. Demonstrate how to make side guide. Show and explain how and where to place register marks on plate.

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TIME	SUBJECT MATTER OUTLINE	INSTRUCTIONAL TACTICS
03:20	8. RUN JOB a. Start run b. End run	Demonstrate the proper sequence in using the controls in running the job. Show how to check sheets for register. Ask questions to check student understanding. Explain importance of setting counter for proper count. Demonstrate the pulling and checking of sheets during run. Demonstrate the proper method of shutting down press at end of run.
03:40	9. WASH-UP OF PRESS a. Preparing for wash-up b. Cleaning inking assembly c. Cleaning dampening assembly d. Cleaning cylinder assembly	Ask questions to check student understanding. Explain importance of safety in using rags on press. Demonstrate cleaning of inking, dampening and cylinder assembly. Explain proper clean up of area to include care and cleaning of all tools used in operation of press. Stress safety throughout demonstration. Ask questions to check student understanding.
(QUESTIONS AND COMMENTS PERIOD)		

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TIME	SUBJECT MATTER OUTLINE	INSTRUCTIONAL TACTICS
		BREAK AT INSTRUCTOR'S DISCRETION
03:50	<u>SUMMARY</u> Quality offset printing depends upon the pressman to properly organize his materials and the ability to set up his press in a manner in which he will have very few problems during operation. He must insure that he has eliminated any problems that might occur in the feeding of sheets through the press. If the plate and blanket are not packed and mounted properly many problems will be encountered by the pressman. By far, the most important part of being a top pressman is his ability to get the proper ink and water balance needed to produce a top quality job. The good pressman must be able to identify and correct problems as they occur. During this 4 hour demonstration you have seen how everything you have learned will now be put to use in your next lesson Practice Printing I. All you have learned in the various lessons must be applied in order for you to become a good press operator.	

INSTRUCTOR NOTES

1. SAFETY AND LUBRICATION

- a. Historical data: None
- b. Anecdotes: None
- c. Content: The instructor will remind the student that lubrication and safety play an important part in the Preparation of Press for Operation. In the previous lessons on Operator's Maintenance and Control Feeder and Delivery the student learned safety rules and lubrication procedures. The instructor will review these, in the Preparation of Press for Operation.
- d. Tactics: None

2. MATERIALS

- a. Historical data: None
- b. Anecdotes: None
- c. Content: The instructor will explain the importance of the pressman being organized prior to operating the press. He will emphasize the need for having the proper materials on hand so as to prevent lost time in hunting up items he may have need of during operation.
- d. Tactics: None

3. SET UP FEEDER AND DELIVERY

- a. Historical data: None
- b. Anecdotes: None
- c. Content: The instructor will review the procedures the student learned in the C F D assembly as he prepares the C F D for Preparation of Press for Operation during the demonstration.
- d. Tactics: None

4. CYLINDER ASSEMBLY

- a. Historical data: None

- b. Anecdotes: None
- c. Content: The instructor will review the procedures the student learned in the lesson, "Cylinder Assembly". He will explain and demonstrate the procedure for measuring the image on the plate prior to mounting, to insure that when the student starts to print he will know exactly what the image size will be on the printed sheet. The instructor will explain that if the printed sheet image size is not the same as the plate image size he will have to adjust packing to get the printed image size on the sheet the same as the plate image size.
- d. Tactics: An audio-visual slide presentation could be shown to help the student understand how the changing of the packing under the plate or blanket will change the image size on the printed sheet.

5. DAMPENING ASSEMBLY

- a. Historical data: None
- b. Anecdotes: None
- c. Content: The instructor will demonstrate the proper mixing of the fountain solution prior to operation. He will review procedures the student learned in the lesson on Dampening Assembly. He will explain the term Ph factor and demonstrate how to test the Ph of the fountain solution. The instructor will show the students the proper procedure for dampening up the rollers prior to operating the press. He will demonstrate how to check the form roller to plate adjustment by means of the "Heart beat method".
- d. Tactics: The instructor may hand out the programmed text on Ph factor during the introduction to preparation of press for operation or during the dampening assembly portion of the lesson. This text may be used as the student homework assignment, to be completed prior to the lesson on practice printing.

6. INKING ASSEMBLY

- a. Historical data: None
- b. Anecdotes: None
- c. Content: The instructor will demonstrate how to properly mix the ink before placing it in the fountain. He will review the procedures the student learned in the lesson on inking assembly.

He will demonstrate how to adjust the ink fountain keys and then ink-up the press. The instructor will show the student how to drop the ink rollers on a dry plate and properly check the 1/8" to 3/16" ink bead. This will insure that the rollers are properly set.

d. Tactics: None

7. PRINTING FIRST SHEETS

a. Historical data: None

b. Anecdotes: None

c. Content: The instructor will demonstrate how to run sheets through the press and produce a printed image. He will explain how to check the image on the sheet for proper position and if any adjustments are necessary the instructor will explain and demonstrate the necessary moves needed to properly position the image on the sheet. The instructor will demonstrate how to place registration marks on the plate and demonstrate how the student will check sheets to see that they are registering correctly.

d. Tactics: None

8. RUN JOB

a. Historical data: None

b. Anecdotes: None

c. Content: The instructor will explain the procedures the student will use to start the press run and how he will check sheets during the run. He will show the students how to properly shut down the press on completion of the press run.

d. Tactics: None

9. WASH-UP OF PRESS

a. Historical data: None

b. Anecdotes: None

c. Content: The instructor will explain that the wash-up of the press is important when doing multi-color work. If not done properly colors left on the press will blend together and true color reproduction will not be possible.

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A demonstration will be given on the proper wash-up procedures. The instructor will explain the importance of cleaning and checking, the dampening, inking, and cylinder assemblies, prior to securing the press from operation.

d. Tactics: None

10. **EXPLANATION**

This lesson was last systems engineered October 1969.

STUDENT ADVANCE SHEET

LESSON: Prepare Press for Operation

OBJECTIVE: To demonstrate to the student the procedures he will use to prepare the offset press for operation, using the procedures the student learned in the control, feeder and delivery, cylinder, dampening and inking assemblies. The instructor will demonstrate how these assemblies are prepared in the preparation of the press for operation. The student will be shown how to properly mix ink, and learn the make-ready procedures he must follow to produce a printed sheet. He will also learn the proper procedure to wash-up the offset press prior to the completion of this lesson. (At the end of this lesson the student will be able to set up and operate the offset press and produce a quality printed sheet).

STUDY REFERENCES: The following reading assignments will be accomplished prior to this period of instruction.

a. Personnel assigned to ATF-Chief 29;

TM 5-245 (7-70), Offset Photolithography and Map Reproduction, Chap 8, Sec VI, para 8-20; Sec VIII, para's 8-25, 8-26; Sec IX, para's 8-27, 8-28; Sec X, para's 8-29, 8-30.

b. Personnel assigned to Harris LIG;

Harris Operators Manual; Sec XIV, para's 118-119.

SUPPLEMENTARY INFORMATION: The instruction will be accomplished in the following sequence:

1. Lecture and demonstration. (4 Hours)

- a. An explanation of safety and lubrication.
- b. An explanation of preparing for operation.
- c. A demonstration - review of feeder and delivery operation.
- d. A demonstration - review of plate and blanket installation.
- e. A demonstration - explanation of dampening assembly.
- f. A demonstration on inking assembly.
- g. A demonstration on printing first sheets.
- h. A demonstration on running the job.
- i. A demonstration on wash-up of the press.

2. Student Homework assignments: As part of this lesson the student will complete the programmed lesson on Ph factor. (2 Hours).

SOURCE MATERIALS

LESSON: Prepare Press For Operation

1. Safety and Lubrication - TM 5-245

- a. Paragraph 8-3
- b. Paragraph 8-2, d

2. Materials - TM 5-245

- a. Paragraph 8-28, a
 - (1) Paragraph 8-27
 - (2) Paragraph 8-27
 - (3) Paragraph 8-27

3. Set up Feeder and Delivery - TM 5-245

- a. Paragraph 8-28, c
- b. Paragraphs 8-8, 8-13
- c. Paragraphs 8-8, 8-13

4. Cylinder Assembly - TM 5-245

- a. Paragraph 8-28, d
- b. Paragraph 8-28, d
 - (1) Paragraph 8-16, 1, a, b
 - (2) Paragraph 8-16, 1, a, b
 - a. Paragraph 8-16, b
 - b. Paragraph 8-16, b
 - (3) Paragraph 8-16, g, 1, c

5. Dampening Assembly

- a. TM 5-245, paragraph 8-28, f
 - (1) TM 5-245, paragraphs 8-22, 8-24
 - (2) TM 5-245, paragraphs 8-22, 8-24
- b. TM 5-245, paragraph 8-20, b
- c. TM 5-245, paragraph 8-20, c, (1)
- d. TM 5-245, paragraph 8-28, g, (1)
 - (1) TM 5-3610-202-15, Chap 2, Sec I, paragraph 2-21, 2-22

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(2) TM 5-3610-202-15, Chap 2, Sec I, para 2-21

c. TM 5-3610-202-15, Chap 2, Sec I, para 2-22

6. Inking Assembly

a. TM 5-245, paragraph 8-24

(1) TM 5-245, paragraph 8-24, a, (2)

(2) TM 5-245, paragraph 8-24, a, (2)

b. TM 5-245, paragraph 8-26

c. TM 5-245, paragraph 8-26, d

d. TM 5-3610-202-15, Chap 2, Sec I, para's 2-63, 2-64, 2-65

e. TM 5-3610-202-15, Chap 2, Sec I, para's 2-65, 2-66

f. TM 5-3610-202-15, Chap 2, Sec I, para 2-15

g. TM 5-245, paragraph 8-28, g, (2)

7. Printing First Sheets - TM 5-245

a. Paragraph 8-28, h, (2)

b. Paragraph 8-28, j, (1)

(1) Paragraph 8-28, h, (1) thru (3)

(2) Paragraph 8-28, j, (1)

(3) Paragraph 8-28, j, (2)

(4) Paragraph 8-28, j, (4)

c. Paragraph 8-28, m, (1)

d. Paragraph 8-28, m, (1)

8. Run Job - TM 5-245

a. Paragraph 8-28, m, (2), (3)

b. Paragraph 8-28, n

9. Wash-up of Press - TM 5-245

a. Paragraph 8-30, b

b. Paragraph 8-30, c

c. Paragraph 8-30, d

d. Paragraph 8-30, e

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LESSON REFERENCE FILE

OFFSET PRESS OPERATION

T.440-115



APRIL 1969

US ARMY ENGINEER SCHOOL - FORT BELVOIR, VIRGINIA

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NOTE: This LRF serves as the source of information for all lessons taught on this subject, though length, methods, and objectives will vary with courses. The specific length, methods and objectives will be determined by the FOI and so reflected in ILPs.

This publication supersedes LRF, T.012-8A (4-63) OFFSET PRESS OPERATION.

SECTION I
LESSON SUPPORT REQUIREMENTS

SUBJECT: Offset Press Operation

LESSON: Offset Press Operation

TRAINING AIDS AND DEVICES:

1. D. A. Training Aids: None
2. Service Training Aids: Offset Printing Press

MATERIALS AND SUPPLIES:

1. 500 sheets of used stock, printed on one side and 1000 sheets of new mapstock.
2. $1\frac{1}{2}$ lbs of black, brown, blue, red and green ink per student
3. Gum
4. Etch
5. Five rags per press per day
6. Offset printing plates

EQUIPMENT:

1. Offset press and tools
2. Micrometer
3. Steel rule

FACILITIES:

1. Classroom: Equipped with desks and blackboard.
2. Training Area Facilities: Pressroom P.E. area equipped with offset presses.

TRANSPORTATION: None

ADDITIONAL PERSONNEL AND DEMONSTRATION TROOPS:

1. Assistant Instructor(s): One instructor for every two presses.
2. Demonstration Troops: None

TEXT REFERENCES:

1. Required References:

- a. TM 5-245 (Sep 62), Map Reproduction.
- b. TM 5-3610-202-15 (Mar 63), Printing Press Offset Cylinder-Rotary.
- c. Operating Manual, Harris LXG.

2. Excerpted Reference: None

SECTION II LESSON OUTLINE

SUBJECT: Offset Press Operation

LESSON: Offset Press Operation

TIME PERIOD: 178 Hours

TYPE OF LESSON: Practical Exercise

OBJECTIVE(S): To provide the student with a qualified knowledge of press operation in the reproduction of maps, charts and related printed material; daily maintenance; graded exercise and critique.

SUPPORT REQUIREMENTS: Refer to SECTION I

STUDENT REFERENCES: Refer to Schedule of Instruction

INTRODUCTION

00:00 In the previous lessons the offset press was taught in four phases: controls, feeder and delivery assembly; cylinder assembly; dampening assembly and the inking assembly. Those lessons have covered the nomenclature, function, and operation of the various assemblies. The previous lesson was "Preparation of a Press for Operation" and concluded the formal instruction in this phase of the press operations. Sufficient information has been presented to allow the operation of the press with a minimum of assistance and supervision. The next period of instruction will be allotted to actual press operation with this minimum of assistance and supervision. The application of the gained knowledge of the offset press will be in the areas of ungraded practice printing and one graded printing project. This entire period of instruction will allow valuable practical operation on the presses and in meeting some of the everyday problems that will appear later in actual field environment.

DEVELOPMENT

- 00:02 1. EXPLAIN THE GUIDES TO PRACTICAL EXERCISES
- a. Practice printing

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- (1) Purpose
- (2) Requirements
- (3) Materials and supplies needed
- (4) Performance of the printing exercise

b. Three-color map

- (1) Purpose
- (2) Requirements
- (3) Materials and supplies needed
- (4) Performance of the printing exercise

c. Five-color map and photomap

- (1) Purpose
- (2) Requirements
- (3) Materials and supplies needed
- (4) Performance of the printing exercise

00:25 2. LUBRICATION
00:30 3. SAFETY
00:35 4. PRESS TECHNIQUES
00:42 5. WASH-UP PROCEDURES

(QUESTIONS AND COMMENTS PERIOD)

SUMMARY

00:47 1. Explain the Guides to Practical Exercise
2. Lubrication
3. Safety
4. Press Techniques
5. Wash-up Procedures

00:50 BREAK

01:00 - 178:00 PRACTICAL EXERCISES

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SECTION III
SOURCE MATERIAL
OFFSET PRESS OPERATION

INTRODUCTION

In the previous lessons the offset press was taught in four phases: controls, feeder and delivery assembly; cylinder assembly; dampening assembly; and the inking assembly. The student has been taught the nomenclature, function, and operation of these assemblies. During the last lesson "Preparation of a Press for Operation" was taught which concluded the formal instruction. The student should now have sufficient knowledge to operate the press with a minimum of assistance and supervision. The next 178 hours will be allotted to press operation. The student may apply his knowledge of the offset press to perform ungraded practice printing as well as two graded printing projects. This period will enable him to get valuable practice in running the presses and in meeting some of the everyday problems that he will have later on when assigned as a pressman.

DEVELOPMENT

1. EXPLAIN THE GUIDES TO PRACTICAL EXERCISES

a. Practice printing.

(1) Purpose. The purpose of this exercise is to provide the student sufficient practice to qualify him in the operation of the offset press and to prepare him for graded printing exercises to follow.

(2) Requirements. During the exercise, each instructor will stress all points of safety, correct unsafe acts and demonstrate and/or explain correct procedures the student will follow. Two students will be assigned to each press. A total of 146 hours will be allotted to complete the exercise. Each student will set up the press for operation and practice printing simple line work. At the end of each day the press will be washed up, with the student performing as pressman being responsible for proper completion.

(3) Materials and supplies needed.

- (a) Offset press and tools
- (b) 500 sheets of used stock, printed one side
- (c) $\frac{1}{2}$ lb black ink per student
- (d) Student Handout; Press Techniques (Appendix 2 to

Annex C)

(4) Performance of the printing exercise. The students will prepare the presses for operation as outlined in previous classes. Five hundred sheets of stock will be issued to each student. Students will wind, jog, and place stock on feedboard. Students will then complete the remaining make-ready operations. The instructor will supervise each step as the student performs the make-ready procedure and practice printing. After student produces an acceptable copy, the instructor will check final make-ready sheet and OK the sheet for the practice press run. During the press run, instructor will observe student for proper press technique and assure that the student is aware of the safety procedures to preclude possible injury to personnel or damage to equipment. After the press run, the instructor will check the printed sheets, observe the wash-up procedure, point out and thoroughly explain any discrepancies in the printed sheet and violations of press technique that he observed during the run.

b. Three-color map.

(1) Purpose. To train the students in all operations necessary to operate a lithographic offset press in the printing of a three-color topographic project.

(2) Requirements. Each student will set up the press for operation and complete a three-color printing exercise. Instructors will supervise and assist the student when necessary; they will make on-the-spot corrections of violations of procedure and will be especially alert to correct safety violations.

(3) Materials and supplies needed.

- (a) Offset press and tools
- (b) 500 sheets of map stock
- (c) $\frac{1}{2}$ lb black ink per student
- (d) $\frac{1}{2}$ lb red ink per student
- (e) $\frac{1}{2}$ lb blue ink per student

(4) Performance of the printing exercise. The student will prepare the press for operation as outlined in previous classes. He will be given 500 sheets of stock and made familiar with the grading procedure as outlined on the Job Evaluation Form. Allowance for normal waste will be 50 sheets per color. Each student will perform as press operator during the printing of his job. The other student assigned to the press will assist the operator, as required, in any task other than operate the press. Upon completion of each color cycle the student performing as pressman will be responsible for wash-up, care of plate and the press. The instructor will point out and explain thoroughly any errors in the printed sheet.

Violation of press techniques that were observed will be explained to the student.

c. Five-color map and photomap.

(1) Purpose. To train the student in all operations necessary to operate a lithographic offset press in the printing of a five-color topographic project.

(2) Requirements. Each student will set up the press for operation and complete a five-color printing exercise. A total of 32 hours will be allotted to complete this exercise. Instructors will supervise and assist the students when necessary; they will make on-the-spot corrections and grade violations of safety procedure.

(3) Materials and supplies needed.

- (a) Offset press and tools
- (b) 500 sheets of map stock per student
- (c) $\frac{1}{2}$ lb black, red, brown, blue, green ink per student

(4) Performance of the printing exercise. Student will prepare the press for operation as outlined in previous classes. He will be given 500 sheets of stock and made familiar with the grading procedure as outlined in the Job Evaluation Form. Allowance for normal waste will be 50 sheets per color. Each student will perform as press operator during the printing of his job. The other student will assist the operator, as required, in any task other than operating the press. During the exercise the instructor will use the Practical Exercise Grading Sheet as a guide in grading the student as he performs. Upon completion of each press run the quality of the finished sheets will be graded. Upon completion of each color cycle, the student performing as pressman will be responsible for wash-up, care of plate and the press, and will be graded for these operations. The instructor will point out and explain thoroughly any discrepancies on the printed sheet. Violations of press techniques that were observed and graded will also be explained to the student.

2. LUBRICATION

The productive life of a press will be shortened by the lack of lubrication or the use of poor lubricants. Correct lubrication will reduce wear on all moving parts. If we follow these simple

rules: (1) lubricate the press thoroughly at the beginning of each day (shift), (2) clean and lubricate gears every week, and (3) service all alowite (grease) fittings every week, we should have no trouble with preventive maintenance.

Preventive maintenance will keep the press in condition for any job called for in the schedule. It means knowing the press, keeping it properly lubricated, carefully inspecting it for worn parts and periodically checking for loose screws, etc., which could go through the press. If it can be anticipated when replacement parts will be needed, it will help prevent down-time and loss of production. Replacements for parts beginning to show wear should be on hand before an actual breakdown, making it possible to install them without interrupting the press schedule.

3. SAFETY

Since the press contains many exposed moving parts such as rollers, gears, chains, and sprockets, great care must be exercised during operation to prevent serious accidents.

The following "SAFETY DON'TS" should be practiced, for all of them are high on the pressroom accident list:

- Don't run the press without the guard in place
- Don't make adjustments while the press is running
- Don't reach into the machine to clean, lubricate or adjust without turning the control switch to SAFE or pulling the main power switch
- Don't wear clothing that can become entangled in the moving parts of the machine
- Don't carry objects in your pockets that may fall into the machine
- Don't clean moving parts while the machine is running
- Don't fail to report electrical or mechanical troubles at once
- Don't wear rings, watches, lockets, or dog tags while operating the machine
- Don't allow paper, grease, or oil to remain on platforms or floors around the press
- Don't indulge in "horseplay" around the press

NOTE: APPENDIX 2 to ANNEX C (Student Handout) should be explained to the students because it lists the point loss for safety violations.

4. PRESS TECHNIQUES

All press techniques are outlined in the Student Handout, APPENDIX 5 to ANNEX C. This should be thoroughly explained to the student

before all graded exercises.

5. WASH-UP PROCEDURES

Immediately following the completion of the run, gum and dry the plate. Remove the ink from the ink fountain and the fountain solution from the water fountain. Fold sheets of paper over the dampening assembly and clean the ink rollers (one side at a time). Clean the wash-up tray and the ink fountain by hand. Finally, clean all cylinders and bearers and be certain that all rags, paper, and other waste around the press are disposed of.

SUMMARY

This is the end of the formal instruction. Lectures and demonstrations on the controls, feeder and delivery assembly; cylinder assembly; dampening assembly; and inking assembly, have been presented. Today, put all this information together and start printing. To finish the course a student must complete a three-and five-color map. These two maps will be far from perfect but no man can really call himself an expert until he has a thorough understanding of his tools. In order to work intelligently he must not only know how but also why they work. This comes with experience. Experience counts much in good pressmanship. The pressman who thoroughly understands his equipment and materials is in a better position to do better work. There is really no limit for a man who understands what he is doing.

STUDENT PRACTICAL EXERCISE

EXERCISE #1

SUBJECT: Offset Press Operation

LESSON: Practice Printing

OBJECTIVE(S): To provide the student sufficient practice to qualify him in the operation of the offset press and to prepare him for the graded printing exercises to follow.

NOTE TO INSTRUCTOR:

1. During the exercise, each instructor will stress lubrication, maintenance, all points of safety, correct unsafe acts and demonstrate and/or explain correct procedures the student must follow.
2. Two students will be assigned to each press.
3. A total of 1 1/6 hours will be allotted to complete the exercise. Each student will set up the press for operation and practice printing of simple line work.
4. At the end of each day the press will be washed up, with the student performing as pressman being responsible for proper completion.

MATERIALS AND SUPPLIES REQUIRED:

1. 500 sheets of used stock printed one side
2. 1/2 lb ink per student
3. Student Advance Sheet, Press Techniques and Safety
(APPENDIX 2 to ANNEX C)

EQUIPMENT:

1. Tools
2. Offset press

FACILITIES REQUIRED:

1. Offset press classroom

ANNEX C
T.440-115 (4-69)

TRANSPORTATION: None

ADDITIONAL PERSONNEL:

One assistant instructor for each two presses.

STUDENT REQUIREMENTS:

1. Student will prepare press for operation as outlined in previous classes. Five hundred sheets of stock will be issued to each student. Students will wind, jog and place stock on feedboard. Students will then complete the remaining make-ready procedures.
2. Instructor will supervise each step as the student performs the make-ready procedures and the practice printing. After each student produces an acceptable copy, the instructor will check final make-ready sheet and OK the sheet for the practice press run.
3. During the press run, instructor will observe student for proper press techniques and assure that the student is aware of the procedures to preclude possible injury to personnel or damage to equipment.
4. After the press run, instructor will check the printed sheets, observe the wash-up procedures, point out and thoroughly explain any discrepancies in the printed sheet and violations of press techniques that he observed during the run.

STUDENT PRACTICAL EXERCISE

EXERCISE #2

SUBJECT: Offset Press Operation
LESSON: Three Color Map
OBJECTIVE(S): To train the student in all operations necessary to operate a lithographic offset press in the printing of a three-color map.

NOTE TO INSTRUCTOR:

1. Two students will be assigned to each press.
2. Each student will set up the press for operation and complete a three-color map.
3. During the exercise, students will follow their make-ready procedure sequence to properly adjust the press. Instructors will supervise and assist the student when necessary. They will make on-the-spot corrections of violations of procedure and will be especially alert to correct the student on safety violations.

MATERIALS AND SUPPLIES REQUIRED:

1. 500 sheets of map stock
2. $\frac{1}{2}$ lb black ink per student
3. $\frac{1}{2}$ lb red ink per student
4. $\frac{1}{2}$ lb blue ink per student

EQUIPMENT:

1. Tools
2. Offset press

FACILITIES REQUIRED:

One offset press classroom.

TRANSPORTATION: None

ADDITIONAL PERSONNEL:

One assistant instructor for each two presses.

STUDENT REQUIREMENTS:

1. Students will prepare press for operation as outlined in previous classes. He will be given 500 sheets of stock, allowance for normal waste will be 50 sheets per color.
2. Each student will perform as press operator while printing each color of his job. The other student assigned to the press will assist the operator, as required, in any task other than operating the press.
3. Upon completion of each color cycle the student performing as pressman will be responsible for wash-up, care of plate and press. The instructor will point out and explain thoroughly any errors in the printed sheet. Violations of press techniques and safety that were observed will be explained to the student.

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STUDENT PRACTICAL EXERCISE

EXERCISE #3

SUBJECT: Offset Press Operation

LESSON: Five-Color Map and Photomap

OBJECTIVE(S): To train the student in all operations necessary to operate a lithographic offset press in the printing of a five-color map.

NOTE TO INSTRUCTOR:

1. Two students will be assigned to each press.
2. A total of 32 hours will be allotted to complete the exercise. Each student will set up the press for operation and complete a five-color map and photomap.
3. During the exercise students will follow their make-ready procedure sequence to properly adjust the press. Instructors will supervise and assist the students when necessary. They will make on-the-spot corrections and grade violations of safety procedure.

MATERIALS AND SUPPLIES REQUIRED:

1. 500 sheets of map stock
2. $\frac{1}{2}$ lb black, red, brown, green, blue ink per student

EQUIPMENT:

1. Offset press
2. Tools

FACILITIES:

One offset press classroom.

TRANSPORTATION: None

ADDITIONAL PERSONNEL:

One assistant instructor for each two presses.

STUDENT REQUIREMENTS:

1. Students will prepare press for operation, as outlined in previous classes. He will be given 500 sheets of stock and made familiar with the grading procedure as outlined in the Practical Exercise Grading Sheet. Allowance for normal waste will be 50 sheets per color.
2. Each student will perform as press operator while printing each color of his job. The other student assigned to the press will assist the operator, as required, in any task other than operating the press.
3. During the printing exercise, the instructor will use the Practical Exercise Grading Sheet as a guide in grading the student as he performs. Upon completion of each color cycle the student performing as pressman will be responsible for wash-up, care of plate and press. The instructor will point out and explain thoroughly any errors in the printed sheet. Violations of press technique that were observed and graded will be explained to the student.

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STUDENT PE ADVANCE SHEET

SUBJECT: Offset Press Operation

LESSON: Offset Press Operation

OBJECTIVE(S): To provide each student with an opportunity to demonstrate a qualified knowledge level of proficiency in the operation of the offset press.

REFERENCES:

1. TM 5-245, (Sep 62), Map Reproduction.
2. TM 5-3610-202-15, (Mar 63), Operator, Organization, Field and Depot Maintenance Manual.

REQUIREMENTS:

1. Exercise #1. During this exercise each student will set-up the press for operation and practice printing of simple line work. Instructors will stress lubrication, maintenance, all points of safety, correct unsafe acts and demonstrate and/or explain correct procedures the student must follow.

2. Exercise #2. During this exercise each student will set-up the press for operation and complete a three-color map. Instructors will supervise and assist the student when necessary, they will make on-the-spot corrections of violations of procedures and will be especially alert to correct the student on safety violations.

3. Exercise #3. During this exercise each student will set-up the press for operation and complete a five-color map. Instructors will supervise and assist the student when necessary. They will make on-the-spot corrections and grade violations of safety procedures.

APPENDIX 1 to ANNEX C
T.440-115 (4-69)

STUDENT HANDOUT

PRESS TECHNIQUE

Following is a list of violations of good offset press operation. Two points will be subtracted for each violation during graded exercises.

- a. Mishandling of plate before mounting.
- b. Mounting or removing plate with guard on.
- c. Removing blanket without first releasing tension.
- d. Improper gumming of plate.
- e. Failure to keep plate wet during stops.
- f. Failure to place dampening rollers in #1 position before dropping ink rollers.
- g. Failure to give plate time enough to get wet before dropping ink rollers.
- h. Removing wrong end of plate from press first.
- i. Failure to wash blanket and back cylinder after gumming.
- j. Failure to wash blanket when leaving press for long periods of time.
- k. Failure to wash bearers and cylinders after removing plate and blanket.
- l. Failure to check sheets while running job.
- m. Using wrong side guide.
- n. Suckers hitting the sheet guards on the conveyor board.
- o. Oil holes in roller bearing facing down.
- p. Vibrator blocks not riding properly.
- q. Leaving dampening rollers in #1 position when press is stopped.
- r. Putting press on impression at wrong time.

APPENDIX 2 to ANNEX C

T.440-115 (4-69)

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- s. Improper care of dampening rollers.
- t. Improper press maintenance.
- u. Printing more than 3 sheets at a time during make-ready.
- v. Other violations.

S A F E T Y

Following is a list of safety violations. Five points subtracted for each violation during graded exercises.

- a. Improper use of rags or tools on press.
- b. Making adjustments on press while press is in motion.
- c. Jogging or running press with guards removed.
- d. Trash or liquid on floor around press.
- e. Removing or replacing any part of the press while press is in motion.
- f. Failure to lock or secure any roller or part of the press that might come out.
- g. Failure to have safe switch on when working on press.
- h. Wearing rings, watches or chains while working on press.
- i. Wearing loose clothing, sleeves down, etc.

PRACTICAL EXERCISE GRADING SHEET

NAME

ROSTER NR.

START TIME

FINISH TIME

GRADER

DATE

GRADE

MANNER OF PERFORMANCE FOR JOB EVALUATION T.440-115

OBJECTIVES (DP)

PREPARATION OF PRESS

WTS.

PER

CBS.

1. Preparations of plate clamps
2. Mounting plate correctly (position)
3. Position of stock
4. Adjustment of airblast and suction
5. Setting of pile Height Governor
6. Setting of two Sheet choke
7. Setting of pull-in wheels
8. Adjustment of the head stop bar
9. Proper push for side guide
10. Setting of Drop Bar
11. Proper setting of Register wheels
12. Setting of Delivery Jogger Blades
13. Setting of Ink Fountain Keys
14. Care of Plate during and after running job
15. Adjustment of Ink Rollers
16. Adjustment of Dampener Rollers

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QUALITY OF JOB

1. Image Fidelity: Scratches, finger prints, and low spots
2. Water
3. Ink
4. Register
5. Correct registration marks
6. Excess wastage
7. Observance of Safety Regulations
 - Number of violations 1/2/3/4/5/6/ I 5 pts each
8. Press techniques
 - Number of violations 1/2/3/4/5/6/ I 2 pts each

14
14
14
18
10

REMARKS:

TOTAL

150

TEST

568

(DP)
PRACTICAL EXERCISE TEST
JOB EVALUATION
INSTRUCTORS CUT SHEET

Preparation of Press

1. Yes or No
2. Yes or No
3. Poorly jagged piles: Minus 2
Tail weights set wrong: Minus 1
Corner brackets set wrong: Minus 1
Pile guide bars set wrong: Minus 1
Stock not centered: Minus 1
4. Yes or No
5. Pile not at proper height: Minus 2
Governor not set when at lowest position: Minus 1
Not set approx 2 inches from tail edge: Minus 1
6. Yes or No
7. Yes or No
8. Not centered: Minus 2
Not paralleled: Minus 3
9. Yes or No
10. Too high: Minus 2
Too low: Minus 2
11. Yes or No
12. Yes or No
13. Not even from side to side: Minus 4
Blade not fully seated: Minus 2
14. Scratched, dented or torn: Minus 2
Failed to clean, gum and straighten: Minus 2
15. Yes or No
16. Yes or No

Quality of Job

Items 1, 2, 3, and 4 use chart A

Chart A			
Percentage of bad sheets	Degree of imperfection		
	Slight	Moderate	High
0 to 20%	2	2	4
20 to 40%	4	5	6
40 to 60%	7	8	9
60 to 80%	10	11	12
80 to 100%	12	13	14
Overtime - 1 pt per ea 5 min up to 1 hour			

5. Yes or No

6. Use chart B

Chart B	
<u>Chart B - Penalty for excess waste</u>	
<u>Sheets wasted in excess of allotted 50 for each color</u>	<u>Points</u>
20 to 40 sheets	2
40 to 80 sheets	4
80 to 100 sheets	8
100 to 120 sheets	12
120 to 140 sheets	16
140 to 150 sheets	20
150 to 200 sheets	25
200 to 250 sheets	30
250 to 300 sheets	35
300 to 350 sheets	40
350 to 400 sheets	45
400 to 450 sheets	50

7. Observance of Safety Regulations

Subtract 5 points each

8. Press Techniques

Subtract 2 points each

GRADE

CRS.

- 7

150

5133

(LXG)
PRACTICAL EXERCISE TEST
JOB EVALUATION
INSTRUCTORS CUT SHEET

Preparation of Press

1. Yes or No
2. Yes or No
3. Poorly jogged pile: Minus 2
Stock not centered: Minus 2
File guide bars too loose: Minus 1
File guide bars too tight: Minus 1
4. Yes or No
5. Pile not at proper height: Minus 2
Governor not set at lowest position: Minus 1
Governor not set approx 3/8 inches from tail edge: Minus 1
6. Yes or No
7. Yes or No
8. Not centered: Minus 4
9. Wrong side used: Minus 1
Improper amount of pull: Minus 1
Raising arm locking mechanism unlocked: Minus 1
Arm not in proper position: Minus 1
10. Too high: Minus 1
Too low: Minus 2
11. Not touching sheet: Minus 2
Buckling sheet: Minus 1
Unequal tension: Minus 1
On wrong tapes for sheet size: Minus 1
12. Yes or No
13. Yes or No
14. Not even from side to side: Minus
Not enough gap: Minus 2

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15. Scratched, dented or torn: Minus 2
Failed to clean, gum and straighten: Minus 2
16. Yes or No
17. Yes or No

Quality of Job

Items 1, 2, 3, and 4 use chart A

Chart A			
Percentage of bad sheets	Degree of imperfection		
	Slight	Moderate	High
0 to 20%	2	2	4
20 to 40%	4	5	6
40 to 60%	7	8	9
60 to 80%	10	11	12
80 to 100%	12	13	14
Overtime - 1 pt per ea 5 min up to 1 hour			

5. Yes or No
6. Use chart B

Chart B	
Chart B - Penalty for excess waste	
Sheets wasted in excess of allotted 50 for each color	
	Points
20 to 40 sheets	2
40 to 80 sheets	4
80 to 100 sheets	8
100 to 120 sheets	12
120 to 140 sheets	16
140 to 150 sheets	20
150 to 200 sheets	25
200 to 250 sheets	30
250 to 300 sheets	35
300 to 350 sheets	40
350 to 400 sheets	45
400 to 450 sheets	50

7. Observance of Safety Regulations
Subtract 5 points each
8. Press Techniques 3
Subtract 2 points each 24

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LESSON PLAN

PRACTICE PRINTING I
740-303-B-010-020

OFFSET PRINTING



October 1974

DEFENSE MAPPING SCHOOL - FORT BELVOIR, VIRGINIA

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740-303-B-010-020

ORIENTATION SHEET

SEGMENTSBLOCKSLESSONS

Press Fundamentals
(104 hours)

MAKE-READY & OPERATING
PROCEDURES (37 hours)

Prepare Press For
Operation (4 hours)

OFFSET PRESS OPERATING
PROCEDURES (172 hours)

PRACTICE PRINTING I
(32 hours)

Identify Printing
Problems (1 hour)

LESSON REQUIREMENTS SHEET

COURSE: Offset Printing

LESSON: Practice Printing I

OBJECTIVE: Given an offset press (LKG or ATF-DP), press tools, cleaning materials, list of safety rules, TM 5-245, and Harris Operator's Manual, the student will perform make-ready and operational procedures to obtain clean error free printed sheets. At the completion of the daily practical exercise, the student will perform wash-up procedures to clean the press to the satisfaction of the supervisor. All actions will be accomplished in accordance with procedures outlined in the manual provided.

TIME: 32 Hours: 32PE

TRAINING AIDS AND DEVICES:

1. Audio-Visual Aids or Devices: None
2. DA Training Aids: None
3. Service Training Aids: None

MATERIALS AND SUPPLIES:

- | | |
|---------------|---------------------|
| 1. Map Stock | 1 ream per student |
| 2. Offset Ink | As required |
| 3. Gum | As required |
| 4. Etch | As required |
| 5. Rags | 5 per press per day |
| 6. Plate | 1 per press per day |

EQUIPMENT: None

TRAINING AREA:

- Indoor: 1. 30-man classroom equipped with desks, chairs and chalkboard.
2. Pressroom equipped with one offset press and workbench and tool set for each group of designated student.

Outdoor: None

ADDITIONAL PERSONNEL AND DEMONSTRATION TROOPS:

1. Assistant Instructors:

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- a. Demonstration: One assistant instructor per designated group.
- b. Practical Exercise: Six assistant instructors.

TEXT REFERENCES:

1. Instructor References: TM 5-245 (7-70), Offset Photolithography and Map Reproduction, Chap 8, Section VIII, para 8-25 thru 8-26, Chap 8, Section IX, para 8-27 thru 8-28, Chap 8, Section X, para 8-29 thru 8-30.
2. Student References: TM 5-245 (7-70), Offset Photolithography and Map Reproduction, Chap 8, Section VIII, para 8-25 thru 8-26, Chap 8, Section IX, para 8-27 thru 8-28, Chap 8, Section X, para 8-29 thru 8-30.
3. Average Student Homework Time: None

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LESSON OUTLINE

LESSON: Practice Printing I

TIME	SUBJECT MATTER OUTLINE	INSTRUCTIONAL TACTICS
	<u>INTRODUCTION</u>	
00:00	In your last lesson, PREPARATION OF A PRESS FOR OPERATION, you learned the proper procedures and techniques used in preparation of ink and wash up of the offset press. Today's lesson, PRACTICE PRINTING I is the total application of all previous lessons. You begin offset printing operations. This lesson is the longest in total time, therefore it has been divided into four separate lessons, each of which covers different types of printing. In this lesson, as in all others, you will make a visual safety check before operation, operate all the assemblies in sequence and produce clean printed sheets. You will inspect a sheet and determine if the plate requires twisting or a cylinder swing is required, or it is necessary to make a side guide move. You will make all necessary additions on the plate. The images on the plate will be simple line work in one color. You will be required to practice 100% safety precautions at all times. The skill that you acquire during offset press operation will always be useful to you and you will have the opportunity in future lessons to improve and increase your skill. The mark of a good pressman is the ability to produce clean useable sheets in the minimum time, observing prescribed operational and safety procedures. Each of you will be critiqued on your work individually and evaluated as you complete it. Pay close attention to the advice given you by your instructors, as it will serve you well in future classes. The printing	NOTE TO INSTRUCTOR: Distribute a copy of the safety rules to each student prior to instruction. (Appendix 1 to Lesson Outline). NOTE TO INSTRUCTOR: Stress to the student the importance of working as a team during practice printing.

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TIME	SUBJECT MATTER OUTLINE	INSTRUCTIONAL TACTICS
	that you do today is not graded, however the instructors will evaluate your work in the same manner as they will when you are being graded in future lessons. You have all heard the old saying-- Doctors bury their mistakes, lawyers explain theirs away and pressmen print theirs. It does not have to be that way! It is up to you to see that it does not happen.	
	<u>DEVELOPMENT</u>	
00:05	1. GUIDE TO PRACTICE PRINTING a. Purpose b. Requirements c. Performance of printing exercises	Discuss the various guides to complete a printed sheet. Check students understanding by asking questions.
00:30	2. PRESS OPERATION TECHNIQUES a. Press techniques b. Maintenance c. Safety (QUESTIONS AND COMMENTS PERIOD)	Discuss the techniques involved in the operation of the press. Check student understanding by asking questions.
		BREAK AT INSTRUCTOR'S DISCRETION
	<u>APPLICATION</u>	
01:00		32 hrs PE. Student understanding was checked throughout this lesson by instructor (See Instructional Tactics). Safety procedures will be strictly observed.

TIME	SUBJECT MATTER OUTLINE	INSTRUCTIONAL TACTICS
		Administer the practice printing P.E. Each student will have his work checked and evaluated by an instructor. The student will be closely supervised to insure that they follow correct operational procedures and the proper techniques for offset press operation.
		BREAK AT INSTRUCTOR'S DISCRETION
31:45	<u>SUMMARY</u> In this lesson you have had the chance to use the total application of all the lessons you have had previously. You should now have a good insight on the problems encountered and the inter-relationship of the assemblies and components of the offset press. The results of your first practice printing exercise may seem greatly inadequate to you, don't despair because you will have three more lessons in which you will operate your press. You learn by doing and you should profit by any mistakes you have made. Some of you may feel that you will reap a large profit because of the many errors you have made. Consider that it takes a civilian five years to become a journeyman pressman and very likely he will not get to touch a press in the first six months except to wipe up oil and grease. You are here in this course for less than two months and whether you believe it or not you are well on your way towards attaining a skill in offset press operation. The degree of that skill is up to you and how great a desire you have to improve. Although this printing was for practice only you have had your	

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TIMESUBJECT MATTER OUTLINEINSTRUCTIONAL TACTICS

performance critiqued and evaluated by an instructor. You should now understand exactly what is required in the finished press sheet. The many problems that are still unresolved will be covered in the next lesson, IDENTIFY PRINTING PROBLEMS.

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LIST OF SAFETY RULES
OFFSET PRINTING COURSE

1. Remove all jewelry from hands, arms and necks to include dog tags.
2. Remove fatigue jackets and keep T-shirts tucked in because loose clothing is a hazard when working around an offset press.
3. Arrange tools, rags, chemicals and solvents in a neat and orderly manner. If you are not using these items then put them away.
4. Keep your work area clean. Deposit all waste paper and rags in their proper containers.
5. Wipe up spilled liquids immediately. Put cleaning materials away when finished with clean-up.
6. Keep the press area clear of obstacles.
7. Press controls should be on "SAFE" when the press is stopped.
8. Give a warning before starting the press, shout CLEAR, pause, then start the press.
9. Make no adjustments to the press while it is running.
10. Use caution when handling press plates or paper because they can be the cause of severe cuts.
11. No cleaning of running presses. The press IS faster than you!
12. Thoroughly wash any chemicals you get on your hands.
13. No running or horse play of any kind will be tolerated at any time you are in the school.
14. Report all accidents or injuries immediately to an instructor. You are not qualified to determine the degree of injury but the Army has medical personnel who are.
15. When in doubt about anything in the course, stop and ask an instructor.
16. Smoking is permitted only in authorized areas.
17. If you feel ill, have a toothache, or have anything that might cause you to be distracted from operating machinery, then notify an instructor.

INSTRUCTOR NOTES

1. GUIDE TO PRACTICE PRINTING

a. Historical data: None

b. Anecdotes: During previous lessons the student has practiced operating the various assemblies and components of the offset press. This may seem to be a slow and tedious process of learning but it was arranged that way so the student could be well prepared to operate the press. This method has proven itself over many years of application with students. You may consider the earlier lessons as guide posts and the notes taken by the students as directional signs. If the students notes are incomplete then he should check with an instructor. Often this situation of a student not knowing what to do next can be spotted by an alert instructor. Keep in mind that students do not have the pressure of a due-date or deadline to meet. Personnel in an on-the-job-training status usually do not enjoy the luxury of having time for practice printing. One of the most important guidelines that the students should follow is the safety procedures.

c. Content: The instructor will explain the reason for this exercise, the requirements that must be accomplished and the procedure to follow to obtain the desired product.

d. Tactics: None

2. PRESS OPERATION TECHNIQUES

a. Historical data: None

b. Anecdotes: Press techniques are developed over an indeterminate period of time. It is most important that the instructor closely supervise students in this initial practice printing lesson to insure that the students develop good press techniques. Give credit to a student if he tells you, "I am turning the what'chamacallit to get the stuff to go thru the press straight", and you observe him turning the headstop adjustment screws two full turns to parallel the sheet. The student is learning to operate a press and not memorize, what is to him, outlandish nomenclature. The prime concern of every instructor should be CAN THE STUDENT PERFORM EACH TASK TO THE DESIRED STANDARD!

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c. Content: The instructor will discuss the press techniques involved in the operation and the procedure to follow prior to and during operation pertaining to safety.

d. Tactics: None

3. **EXPLANATION**

This lesson was last systems engineered 25 May 1970.

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STUDENT ADVANCE SHEET

SUBJECT: Offset Printing

LESSON: Practice Printing I

OBJECTIVE: Given an offset press (LIG or ATF-DP), press tools, cleaning materials, list of safety rules, TM 5-245, and Harris Operator's Manual, the student will perform make-ready and operational procedures to obtain clean error free printed sheets. At the completion of the daily practical exercise, the student will perform wash-up procedures to clean the press to the satisfaction of the supervisor. All actions will be accomplished in accordance with procedures outlined in the manuals provided.

STUDENT REFERENCES: TM 5-245 (July 1970), Offset Photolithography and Map Reproduction, Chap 8, Section VIII, para 8-25 thru 8-26, Chap 8, Section IX, para 8-27 thru 8-28, Chap 8, Section X, para 8-29 thru 8-30.

SUPPLEMENTARY INFORMATION: The instruction in Practice Printing I will be accomplished in the following sequence:

Student Practical Exercise (32 Hours). This exercise was designed to permit the student sufficient time to practice make-ready operation and wash-up procedures. This exercise will enable the student to meet the requirements set forth in the lesson objective.

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STUDENT PRACTICAL EXERCISE

LESSON: Practice Printing I

OBJECTIVE: Given an offset press (LIG or ATF-DP), press tools, cleaning materials, list of safety rules, TM 5-245, and Harris Operator's Manual, the student will perform make-ready and operational procedures to obtain clean error free printed sheets. At the completion of the daily practical exercise, the student will perform wash-up procedures to clean the press to the satisfaction of the supervisor. All actions will be accomplished in accordance with procedures outlined in the manuals provided.

MATERIALS AND SUPPLIES REQUIRED:

- | | |
|---------------|---------------------|
| 1. Map stock | 1 ream |
| 2. Offset ink | As required |
| 3. Gum | As required |
| 4. Etch | As required |
| 5. Rags | 5 per press per day |
| 6. Plate | 1 per press per day |

EQUIPMENT: None

FACILITIES: Pressroom equipped with one offset press and workbench and tool set for each group of designated students.

TRANSPORTATION REQUIREMENTS: None

ADDITIONAL PERSONNEL: One instructor per two presses.

STUDENT REQUIREMENTS:

1. Student will lubricate the press in accordance with instructions given in the lesson of offset press lubrication, practicing proper safety precautions at all times.
2. Student will prepare the press for operation as outlined in the lesson, preparation of a press for operation. He will be given 500 sheets of map stock.
3. Student will operate paper cutter in accordance with instructions given in the lesson on paper cutter operation observing safety precautions at all times.
4. Each student will have a total of 16 hours to perform as press operator.

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5. The other student assigned to the press will assist the operator as required in any task other than adjustments of operator decisions.
6. Student will position the image as instructed by the instructor and make any adjustments to accomplish this. He will make any additions or deletions that are required. The student will print clean usable printed sheets.
7. Upon completion of each press run the student will have his printed sheets evaluated and critiqued by an instructor.

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SOURCE MATERIALS

LESSON: Practice Printing I

1. Guide to Practice Printing - TM 5-245 (7-70), Offset Photolithography and Map Reproduction
 - a. Paragraph 8-1
 - b. Paragraph 8-25 thru 8-30
 - c. Paragraph 8-25 thru 8-30
2. Press Operation Techniques - TM 5-245 (7-70), Offset Photolithography and Map Reproduction
 - a. Paragraph 8-27 thru 8-28
 - b. Paragraph 8-25 thru 8-30
 - c. Paragraph 8-2

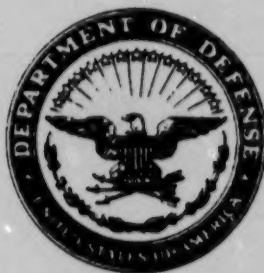
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LESSON PLAN

IDENTIFY PRINTING PROBLEMS

740-303-B-010-030

OFFSET PRINTING



December 1974

DEFENSE MAPPING SCHOOL - FORT BELVOIR, VIRGINIA

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ORIENTATION SHEET

OFFSET PRINTING COURSE

SEGMENTS

Press
Fundamentals
(10 1/2 Hours)

OFFSET PRESS
OPERATING PROCEDURES
(172 Hours)

BLOCKS

MAKE READY AND
OPERATIONAL
PROCEDURES
(37 Hours)

LESSONS

Prepare Press for
Operation (4 Hours)

Practice Printing I
(32 Hours)

IDENTIFY PRINTING
PROBLEMS (1 Hour)

Three Color Map
Exercise (48 Hours)

Five Color Map
Exercise (64 Hours)

Miscellaneous
Printing (23 Hours)

LESSON REQUIREMENTS SHEET

COURSE: Offset Printing

LESSON: Identify Printing Problems

OBJECTIVE: Provided with sample folders containing printed sheets with designated problem areas, the student will identify, and discuss the problem and learn what corrective action, he as a pressman must take to eliminate the problem. Upon completion of this lesson, the student will be able to identify and cope with off-set press problems encountered in the daily operation of an off-set press.

TIME: 1 Hour 1C

TRAINING AIDS AND DEVICES:

1. Audio-Visual Aids or Devices: None
2. DA Training Aids: None
3. Service Training Aids: None

MATERIALS AND SUPPLIES:

- | | |
|---|------------------------------------|
| 1. Sample folder, printing problems | 1 per designated group of students |
| 2. Student reference sheet, offset press difficulties | 1 per student |

EQUIPMENT: None

TRAINING AREA:

Indoor: 36-man classroom equipped with desks, chairs and chalkboard.

Outdoor: None

TRANSPORTATION: None

ADDITIONAL PERSONNEL AND DEMONSTRATION TROOPS:

1. Assistant Instructors: None

TEXT REFERENCES:

1. Instructor References: TM 5-245 (7-70), Offset Photolithography and Map Reproduction, Appendix E.

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Navpers 10454-B, Rate Training Manual,
Lithographer 1 & C, Chap 7.

2. Student References: TM 5-245 (7-70), Offset Photolithography
and Map Reproduction, Appendix E.
3. Average Student Homework Time: Two Hours

Student will complete Programmed Lesson - Printing Problems and
also study Appendix E in TM 5-245, Offset Photolithography and Map
Reproduction (7-70), prior to this lesson.

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LESSON OUTLINE

LESSON: Identify Printing Problems

TIME	SUBJECT MATTER OUTLINE	INSTRUCTIONAL TACTICS
	<u>INTRODUCTION</u>	
00:00	Presses don't act up just to make it tough on the pressman. There are logical reasons for everything that goes wrong, and it is usually not too difficult to correct troubles, once you have found what is causing them. But this is sometimes like hunting for a needle in a haystack - especially for the beginner - because some conditions may be caused by any of a number of things. Tracing the trouble to its source is less difficult for an experienced pressman, because after awhile one develops an almost uncanny instinct about things. Yet, even an experienced pressman can't always put his finger on the source of the trouble immediately. Most press problems are caused by little things, such as incorrect packing behind the plate or blanket, poor ink distribution, or improper ink and water balance. Poor plates will also result in printing problems and so will excessive pressure on the ink and dampener rollers. In this lesson, you will learn how some of these factors affects the quality of the printed sheet.	
	<u>DEVELOPMENT</u>	
00:03	1. PAPER CYCLE a. Paper (1) Does not lie flat (2) Winding (3) Static electricity	Pass out Student Hand-out offset press difficulties. Discuss problems, and solutions covering paper.

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TIME	SUBJECT MATTER OUTLINE	INSTRUCTIONAL TACTICS
	b. Feeder and delivery assembly (1) Improper sheet feeding (a) Pile height (b) Vacuum and blowers (c) Paper guides (d) Sheet separators (2) Conveyor board (a) Pull-in wheels (b) Two-sheet choke (c) Register (wheels) (brushes) (d) Sheet flatner bar (DP) (e) Side guide (f) Head stops (DP) (3) Delivery (a) Jogger blades (b) Pile down mechanism	Ask questions to check student understanding. Discuss problems and solutions on paper feeding problems. Explain these problems, were also covered in control feeder & delivery assembly. Point out that proper feeding of paper will eliminate 90% of problems. Ask questions to check student understanding. Discuss problems and solutions concerning the devices on the conveyor board. Emphasize that the head stops must be parallel. Ask questions to check student understanding. Discuss problems and solutions concerning the delivery assembly. Ask questions to check student understanding. Discuss problems and solutions in dampening system. Emphasize the importance of clean rollers. Ask questions to check student understanding.
00:30	2. PRINTING CYCLE a. Dampening assembly (1) Roller adjustment (2) Dirty rollers	

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TIME	SUBJECT MATTER OUTLINE	INSTRUCTIONAL TACTICS
	b. Inking assembly (1) Roller adjustments (2) Ink fountain keys	Discuss problems and solutions in inking assembly. Ask questions to check student understanding.
	c. Ink and water balance (1) Too much ink or water (2) Too little ink or water (3) Fountain solution	Discuss problems and solutions on ink and water balance. Point out on sample folders areas caused by too much or too little ink and water. Ask questions to check student understanding.
	d. Blanket cylinder (1) Improper packing (2) Loose blanket (3) Low spots (4) Correct image size (a) 1:1 image (black) (b) Image long or short (colors)	Discuss problems and solutions concerning blanket installation, packing. Emphasize procedure for correcting low spots. Emphasize importance of checking for a 1:1 image. Point out on sample folder long or short image problems, and how to correct problem. Ask questions to check student understanding.
	e. Plate cylinder (1) Improper packing (2) Loose plate (3) Image position on plate	Discuss problems and solutions in plate installation. Emphasize importance of checking for 1:1 image. Review how to twist, swing plate.

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TIME	SUBJECT MATTER OUTLINE	INSTRUCTIONAL TACTICS
	f. Impression cylinder (1) Excessive pressure (2) Insufficient pressure (QUESTIONS AND COMMENTS PERIOD) <u>APPLICATION</u> <u>SUMMARY</u> During the last 1 hour of instruction you have been taught what problems and solutions to the problems could and will occur while you are operating an offset press. You have learned during the major assemblies and through practice printing exercises that offset presses are complicated, precision built machines. They require knowledge, experience and skill to operate. How well they perform depends on preventive maintenance, proper make-ready and operation, and the ability of the pressman to foresee and avoid troubles or to quickly trace them to their sources and remove the causes. This knowledge will be applied in the lessons throughout the remainder of your training as an offset pressman. Your next lesson will be a Three Color Map Printing exercise.	Ask questions to check student understanding. Discuss problems and solutions in adjusting, and checking impression cylinder. Ask questions to check student understanding.
00:50		

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OFFSET PRESS DIFFICULTIES

Difficulty	Cause	Remedy
1. Sheets reach front guides out of time -----	a. Too much or too little friction against sheet. Too much friction can bind sheet and slow it down. Too little friction can permit conveyor tapes to slide under the sheet and fail to carry it. b. The feeder pile being too high could cause the suckers to pick up more than one sheet, resulting in a drag of the pile-control post head on the sheet. c. Incorrect timing of the sucker vacuum cam will release the sheet at the pull-in wheels either too soon or late. d. Excess pressure of feeder back bar against feeder pile will cause a pause in the sucker pickup action. e. Side pile finger assemblies set too tight against corners of feeder pile will result in fingers resting on top sheet, causing a drag on sheet. f. Too great airblast causes the sheet to float backwards, resulting in being forwarded out of time.	Check adjustment of two-sheet choke tapes, drop bar, and pull-in wheels. Short sheets may require additional wheels to add friction against tapes. Reset pile height. Reset timing of sucker release cam. Reset feeder back bar Reset pile finger assembly Reduce airblast
2. Sheets do not separate freely -----	Poor or insufficient winding, or gum or water spilled on pile during previous press runs. (May also be due to offsetting or sticking.)	Wind stock to separate sheets and get air between them. Throw away sheets that are too badly stuck together to salvage.
3. Stock does not lie flat -----	Variation in absorbed humidity, or running excessive water on previous press runs.	Condition paper to pressroom humidity. Use wedges and adjust airblast to decrease curl of stock on feeder board. Use metal straps (or improvised) devices to hold curl down on conveyor board.
4. Sheets feed erratically -----	a. Static electricity. Static is encountered whenever the relative humidity of the pressroom falls below 35 percent. When static is present sheets cling together or to press, interfering with normal feeding and printing. b. Variance in size of stock -----	Use air conditioners to keep humidity above 35 percent. Static difficulties can be reduced by grounding press and stretching metal tinsel across several places along stock path to absorb static charge. Smearing glycerin on suckers and other parts of feeder and delivery assemblies may help. The glycerin will not leave a stain after it has dried. Check trailing edge of stock pile. If a "saw tooth" effect is present, remove to cutter and trim trailing edge or replace stock.
5. Overall lightness or uneven streaks. Ink on sheet is not of proper density.	a. Too little ink being used ----- b. Ink fountain empty, or ink may be backing away from fountain roller.	Increase number of notches on ink ratchet, or turn appropriate ink fountain keys out uniformly. Fill fountain if necessary. Stir ink (automatic agitators are manufactured that will stir the ink during the run), or add a varnish that will make the ink flow.

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Difficulty	Cause	Remedy
	c. Ink fountain keys may be improperly adjusted, causing insufficient flow or uneven distribution of ink.	Ink fountain keys should first be set to distribute ink uniformly, and then adjusted during makeready to plate requirements. A thin film of ink (adjusted by keys), and a long revolution of the fountain roller (adjusted by ratchet assembly) is preferable to a heavy film of ink and a short revolution of the fountain roller.
	d. Ink distributing rollers may be improperly adjusted, preventing ink from reaching the form rollers. (This is easily recognizable because some of the ink rollers will be carrying a visibly light or insufficient film of ink, especially when first inking the press.)	Distributing rollers must be properly seated and adjusted to maintain proper contact with fountain, vibrators, and form rollers.
	e. Ink form rollers may be improperly adjusted, failing to receive ink and/or deliver it to the plate. (This is recognizable because the image on the plate does not receive ink, and will not transfer ink to an applied fingertip.)	Form rollers must contact vibrators and plate with proper pressure. Inked form rollers dropped against a stationary gummed plate should leave strips of equal width at both ends and (depending on the size of the press) from $\frac{1}{4}$ to $\frac{3}{4}$ inch wide. Form rollers must remain in contact with vibrators when passing over plate cylinder gap.
	f. Blanket and/or plate may be underpacked, causing the plate to fail to receive ink and/or causing the image to fail to transfer from the plate to the blanket. (This can be easily detected by examining the blanket to see if the amount of ink on the blanket is proportional to the amount of ink on the plate.)	Blanket and plate should be packed sufficiently above bearer height to achieve .003 or .004 inch printing pressure.
	g. Impression cylinder pressure too light for sheet to receive image from blanket.	Increase impression cylinder pressure.
6. Ink may be of proper density on sheet, but will appear "gray," dull, and lifeless.	Too much water being used -----	Reduce water to minimum required for printing without ink catching up.
7. Weak areas in otherwise acceptable print.	a. Blanket surface may be dented or depressed, preventing transfer of image from plate to blanket. If the plate is good, the image will print properly where the blanket is undamaged, but will not appear on the blanket in the dented areas.	If blanket impressions are not severe, apply commercial blanket swelling preparations to the underside of the blanket. If depressions are severe or deep, underside of blanket under the depressed area should be built up with layers of tissue paper.
	b. Low spots in cylinder surface -----	To patch low spots in the blanket cylinder surface, strip plate and blanket cylinders bare, and cement a good new blanket to the plate cylinder with underpacking to total the usual dimensions of both cylinders. Then ink the blanket (on the plate cylinder) up solid, pull the impression cylinder away, put the impression on, and turn the press around to ink up all of the blanket cylinder surface. Paint the portions of the cylinder surface where ink does not transfer with lacquer. When the lacquer dries, repeat the operation, adding lacquer where needed until the entire surface of the cylinder receives an even ink transfer. The patches will be permanent if carefully treated.

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8. Weak, mottled print

- a. Blanket may be glazed, owing to poor cleaning. The glaze is an accumulation of oxidized rubber, varnishes, and gum.
- b. Blanket may be dirty or oily
- c. Impression cylinder may have insufficient pressure against blanket cylinder, preventing the image from transferring between the blanket and the stock.
- d. Blanket may be insufficiently packed for impression cylinder, i.e., when printing on thin stock, the impression cylinder of certain makes of presses cannot be moved sufficiently close to the blanket cylinder for proper printing contact.

Wash blanket thoroughly with an ink solvent and water. If glaze remains, scrub well with the ink solvent and pumice powder.

Use same procedure as in item 8a.

If the image appears satisfactory on the blanket, increase the impression cylinder pressure until an even print is obtained. When the cylinders are out of parallel, or not equipped for parallel movement, consult press manual for procedure and adjust for thickness of stock.

Increase blanket cylinder underpacking, and remove equal packing from under plate to maintain proper printing pressure.

CAUTION

This may cause change in image size, affecting register in multicolor work.

9. Weak print, becoming progressively weaker going across cylinder.

Cylinder bearing may be worn and/or cylinders may be out of parallel, causing insufficient or uneven transfer between plate, blanket, and stock. The image will not transfer properly between the affected cylinders.

Paralleling of cylinders and/or replacement of bearings may be necessary.

10. Weak, gray or spotty print

- a. Steel ink rollers may be stripping. Steel rollers fail to carry ink. Noticeable as strips of bare metal around roller circumference. Caused by glazed rubber rollers, running too much water, or too much acid in the fountain solution.
- b. Rubber ink roller may be glazed. Usually due to ink and drier remaining in the pores of the rubber due to improper washup. This causes the rubber to lose its ink-carrying and distributing qualities.
- c. Ink too stiff to adhere to image. Appears as weak spots in image on plate, blanket, or stock. The ink's affinity for itself is greater than its attraction to the plate.
- d. Ink may be emulsified or waterlogged. May be caused by use of too much drier, too much water, too alkaline a fountain solution, a gum left on a poorly washed-off plate, or poor ink. (Very fresh ink, which has not been "aged" for a long enough period, is very susceptible to emulsification.)
- e. Ink becomes waterlogged because of small image area, which does not use ink fast enough.

If due to glazed rubber rollers, correct cause. Otherwise, wash up rollers in regular manner, then wash up with a weak nitric, acetic, or hydrochloric acid solution, scrubbing with pumice powder if condition is severe. Then wash roller with plain water. Weekly procedure to prevent stripping: Wash up press in usual manner, make a paste of pumice powder and oleic acid, add it to the rollers, and run the press for several minutes. Then wash up again.

Thoroughly scrub roller with an ink solvent and pumice powder to remove the glaze and restore the proper velvety sheen. Washing up with a 3 percent lye solution may also help. If glaze is extensive, roller should be buffed with sandpaper, ground down, or recovered.

Add a thin varnish to the ink

Correct causes. If condition is severe, replace ink.

On forms where the ink coverage is not great, and there is some waste paper (preferably at the back edge of the sheet), it is helpful to put in a small solid area; a strip $\frac{1}{4}$ inch wide running across the plate would be sufficient. This insures a sufficient replacement of the ink on the rollers.

Difficulty	Cause	Remedy
11. Blank areas in image	Ink form rollers may be cracked or pitted, as a result of careless washup over a long period.	None, except to replace rollers. Correct cause.
12. Uneven print	a. When cylinder diameters are unequal, the blanket creeps, and smooth packing sheets will wrinkle and cause an uneven print. The coarser the canvas backing of the blanket, the greater the extent of wrinkled packing. b. Rough textured packing (like regular offset paper) retards wrinkling, since it moves with the blanket. With each revolution of the cylinder, the packing comes back to its original size, providing the steel cylinder surface is smooth.	It is good practice to place the thin packing tissues close to the steel cylinder, and the heavier sheets close to the blanket. Applying a thin coat of machine oil to the tissues with a cloth and wiping it off will help to prevent the steel from rusting. Using soapstone or talc between the blanket and the top packing sheet reduces the friction of canvas against packing. This more evenly distributes the strain placed on the blanket when tightening the reel, and permits a more uniform overall print.
13. Mottled print	a. Ink may be too stiff or too tacky, causing fibers to be plucked or picked from the stock. b. Ink may contain lint, owing to picking of stock, dirty stock, or old, fuzzy dampening rollers. Any of these conditions can cause lint to become mixed with the ink, resulting in a mottled print.	Thin or soften the ink with varnish, mixing thoroughly and adding no more than is needed to correct condition. Keep a record of proportion added for future reference. Use of excessive water is also a contributing factor to picking, so a minimum of water should be run. Correct causes. See item 29 for procedure to correct picking. If necessary, wash up and replace ink.
14. Ink density too heavy on printed sheet. Ink spreads to background areas. Print lacks sharpness.	a. Too much ink being used b. Ink too soft or too greasy c. Too little water being used d. Ink piled up on form rollers, owing to ink vehicle not being able to carry pigment. Drier may have been added too soon, causing setting on rollers. e. Fountain solution reacts with paste (lead) drier in ink, forming a glassy film on the plate and causing difficulty in controlling water distribution. f. Paper stock unsuited for offset printing. Some coated stocks may pick off readily, and may contain a large percentage of alum or other chemicals. These chemicals sensitize the plate to grease, causing scum.	Reduce number of notches on ink ratchet, or turn appropriate ink fountain keys in. It may be necessary to remove excessive ink from the rollers by sheeting. Do not add thin varnishes to ink unless necessary to prevent plucking of stock. Stiffen ink by working in a quantity of No. 8 varnish or magnesia powder. Increase water supply at fountain to minimum required to print properly. Add a heavy varnish. Add driers at the last possible moment before using ink on press. If this does not remove the scum, obtain new plate. Reduce amounts of acid in fountain solution and of drier in ink. If necessary, replace ink. If such stock must be used, "doctoring" of ink to soften it, frequent washups, and a more acid fountain solution will be necessary.
15. Overall tint, usually of less than full color density. Tint does not wash off plate with water. Possible appearance of faint streaks across cylinder.	a. Dampener form rollers set too tight against plate, causing wear of the plate grain either from excessive pressure or from the "bounce" which is likely to develop. b. Blanket and plate cylinders packed to excessively unequal diameters. This prevents true rolling contact	Readjust rollers. Rollers should be checked for warping and/or uneven diameters. If excessive plate wear has not occurred, plate etching the scummed areas may bring relief. Otherwise, a new plate will be required. Repack cylinders to equal diameters. Etch affected areas of plate.

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and causes skidding between the two cylinders, wearing away the plate grain.

16. Ink appearing in background areas in specks or blotches of full color density.

a. Running too little water

Increase water to minimum required to prevent plate from catching up. Proper balance between ink and water must be maintained so that a full density of ink, without scum, is transferred to the stock.

b. Dirty dampening rollers not carrying or transferring water. Caused by running too much or too greasy ink, or insufficient acid in the fountain solution.

Scrub fabric rollers with a stiff brush and water, using soap or solvent only if absolutely necessary. Rinse rollers thoroughly and hang up to dry. If condition is too severe to permit cleaning, replace fabric roller covers.

c. Low or high areas in dampening rollers preventing even contact with the plate.

Clean metal rollers with an ink solvent to remove grease and ink, then rinse with water. Then scrub roller with pumice powder and plate etch, wash with water, and gum.

d. Dampening form rollers too long for press, riding the bearers, and not contacting the plate properly.

Manually scrape, rub up, or underlay with strips of muslin, the low areas. Place rubber water stops against the water fountain roller in wetter areas.

17. Overall tint, usually of less than full color density. Tint does not wash off plate with water.

a. Greasy or poor ink

Procure proper length rollers for press.

b. Insufficient acid in the fountain solution to overcome greasiness of ink.

Etch plate. Increase acidity of fountain solution. Mix powdered magnesia into ink to stiffen it, or replace with good ink. Do not reduce ink with greasy compounds unless necessary to prevent plucking.

c. Oxidized plate. May occur in graining, platemaking, storage, or on press because of exposure to dampness or slow drying of water on plate. When a plate oxidizes, the spots of ink on the background are solid and perfectly round, regardless of size. This should not be confused with spots of pigment from bleeding ink.

Fountain solution should not be higher than 4.6. If this pH does not overcome difficulty, new plate should be made.

d. Plate defective. Becomes evident at start of run as general or localized scumming, owing to incomplete development, too thin a coating, overdevelopment, a poor negative, or overgreasy developing ink.

See item d below for procedure of eliminating local oxidized areas. Badly oxidized plates are usually regrained or discarded.

e. Fountain solution too acid, causing eating away of the plate grain, and/or of the thin protective gum film on the plate surface.

Attempt to clean plate with plate etch, alternately sponging with etch and water. To remove local tint scum, use pumice powder or snakeslip, follow with plate etch, and then wash with water.

18. Discoloration of water on plate and printed sheet. Tint can be easily washed off with water.

a. Ink bleeds, due to coloring matter not being fast in water.

Reduce acidity of fountain solution.

b. Ink emulsified—mixture of pigments, varnishes, driers, etc., breaks down. Results from emulsifying action of wetting agents. (Gum arabic is a weak wetting agent.) May also be due to ink being too fresh—ink

Reduce acidity and amount of fountain solution. It usually will be necessary also to replace the ink.

Strengthen ink with long varnish. Cut down amount of wetting agents. If condition is severe, replace ink.

Difficulty	Cause	Remedy
	should age at least a week after grinding to permit thorough combining of all ingredients.	
19. Ink filling in open areas or image thickening.	a. Too much ink used at start of make-ready. Rollers cannot lift the ink cleanly from the plate in such cases, causing the work to thicken and scum. b. Excessive ink ----- c. Greasy ink -----	Correct cause. Attempt to clean plate by etching. Decrease ink supply. Stiffen ink with No. 8 varnish or magnesia powder, or replace ink.
20. Ink filling in open areas or image thickening. Slight blur apparent toward tail end of sheet.	a. Loose blanket ----- b. Loose plate ----- c. Excess pressure ----- d. Loose roller settings -----	Tighten blanket Tighten plate Check cylinder contacting pressure Reset rollers
21. Blurred areas at regular intervals from front to back of sheet.	Blanket too loose. Humps rise in the rubber, and then slip across the plate.	Tighten blanket
22. Tails on dots, or slight blur at back of image, especially at tail end of sheet.	a. Blanket slightly loose. Hump appears only at end of cylinder revolution. b. Excessive pressure between cylinders. c. Blanket rubber swollen due to absorption of varnishes, driers, and solvents.	Tighten blanket Repack cylinders, or adjust impression cylinder pressure as necessary. Clean blanket thoroughly, or replace with good blanket
23. Streaks of ink running completely around cylinder, of same width and shape on every sheet.	a. Damaged form rollers. (Usually caused by some device on plate cylinder protruding beyond plate height.) b. Dirty wheels, tapes, or control devices in the feeder, conveyor, or delivery assemblies. (May have picked up ink from previously printed colors.)	If rollers are not too badly damaged, treat as in item 16c. Otherwise, replace rollers. Check for offending device on plate cylinder, and tighten if necessary. Clean all devices which contact sheets and, if possible, shift them to an unprinted portion of the sheet.
24. Streaks of lightness in image running around the cylinder. These streaks will vary somewhat in size and shape, and usually will become progressively smaller in area with each succeeding sheet.	Too much water -----	Decrease water supply. Also check for possible emulsification of ink. (See item 10d and correct if necessary.)
25. Scum, alternately light and dark, taking the forms of streaks across cylinder. (Commonly called "gear" streaks), or similar light and dark areas in image. Appears especially at gripper edge of sheet.	a. Squeeze pressure, instead of bearers, driving cylinders. This prevents the bearers from smoothing out the slight chattering action of the gears. b. Excessive difference in cylinder diameters due to incorrect underpacking. Humps rise in blanket and slip across the plate, squeezing away enough water to allow a slight scum. c. Difference in surface speeds of driving roller and plate cylinder, causing form roller to drag against driving roller or plate.	Decrease cylinder packing Repack cylinders properly. Cylinder diameters should be as equal as possible. If plate cylinder is packed properly, and rollers are set with proper pressures, their relative surface speeds should be correct.

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d. Ink form roller sockets worn. Rollers bounce into cylinder gap, lose speed, and then skid when they again contact the plate.	Reset rollers to proper tension. If necessary, replace roller sockets.
e. Ink or dampener form rollers set too tight or too loose to their respective vibrators, causing them to skid on the plate.	Reset rollers to proper tension
f. Glazed ink form rollers skidding on vibrators or plate.	Clean or replace affected rollers
g. Rubber form rollers swollen, causing skidding against vibrators or plate.	Clean or replace, and rest affected rollers
h. Improper press timing. Rollers should vibrate at time plate cylinder gap is up. If the vibrating occurs at any other time, the slight hesitation is apt to cause skidding of the form rollers.	Retime vibrator motion
i. Gear teeth on cylinders or vibrators worn or dirty	Clean affected gears
j. Play between plate and blanket cylinders	Adjust gear segment. See press manual for procedure.
k. Cylinder bearing trouble. Since all three press cylinders are geared together, binding of the bearings of any one will affect the others and interfere with steady even contact between the plate and form rollers.	Depending on the nature of the difficulty, oil press, level press, or install new bearings.
l. Kinks or humps in plate or cylinder underpacking, causing skidding of the form rollers.	Flatten kinks, repack plate, or replace plate
m. Poor paper. Certain kinds of paper (especially very hard coated) show "gear" type streaks regardless of adjustments to press or ink.	Some regular offset stock should be run. If streaks do not then appear, it is the fault of the original stock. The streaks can be eliminated only by replacing stock.
n. Greasy ink or excessively soft ink accentuates any minor irregularities (see above) that might otherwise go unnoticed.	Correct causes, or stiffen or replace ink
28. Weak, gray, or spotty appearance of image on printed sheet.	a. Fountain solution too acid or too alkaline. Too much acid dissolves grain of plate and undermines image. Too alkaline a solution causes image to soften and dissolve. Take a pH reading of solution. Add acid or water as needed to attain desired pH for type of plate being run (usually 4.6 for aluminum). In extreme cases, replacing solution and/or rollers may be necessary. Rub ink and/or asphaltum into weak areas Small areas or lines can be made to print by scratching them with pencil or etching needle. Otherwise, replace plate. b. Etch used carelessly, or too strong. If the etch penetrates the ink film on the image, it is almost certain to destroy the grease-receptiveness of the image. Do not etch plate, unless image is protected with ink or asphaltum by lacquer. Do not allow etch to remain on image areas over 1 minute. c. Gum used carelessly, or gum sour Use gum carefully, as it, too, is a weak desensitizing agent. If gum is sour, replace with fresh gum. d. Too much fountain solution and/or not enough ink used. Water gets ahead of ink on the printed sheet. Unless quickly remedied, the water will penetrate and undermine the image. Wash plate with clean water, and gum carefully. Wash out image with turpentine. Rub a quantity of ink into the image with cheesecloth and smooth it down dry. Wash gum off plate and bring water rollers against plate. If the plate is basically

Difficulty	Cause	Remedy
	e. Developing ink or press ink on image has dried hard, losing its grease-receptiveness. Although this is not truly a blind plate, it is often mistaken for one.	right, it will again be clean and sharp if the proper water-ink balance is maintained. Wash dried ink off with turpentine. Plates which are to be stored for any length of time should be asphaltumed to prevent this occurrence.
	f. Normal life of plate exceeded -----	A greasy asphaltum can be made by adding 1 ounce of oleic acid to 1 gallon of asphaltum. This will insure the image taking ink when the plate is used after storage. Replace plate. On runs that approach maximum plate life, extra plate should be available to assure minimum loss of time.
	g. Cylinders out of alinement, causing excessive wear ---	Realine cylinders
	h. Poor plate. A plate that is underexposed, has too thick a sensitized coating, or has an insecure foundation owing to gum remaining on the grain before sensitization, disintegrates rapidly on the press.	Obtain a new plate
	i. Gum streaks or spots. Spots in image on the plate. Gum may not have been applied smoothly or rubbed down evenly in platemaking or on the press. Usually more pronounced if gum has soured. Results in image areas being sensitized.	Use same procedure as for a blind plate. See Item 26a. Rub the affected image area, first with a sponge containing both water and gum arabic, and then with a firm cloth pad containing rub-up ink and pumice powder. Then alternate until image becomes ink receptive. The water dissolves existing dry gum and the added gum is to replace dissolved gum of the nonimage areas. The pumice powder is used as an abraive, and the rub-up ink to make the blind image grease receptive.
	j. Binding due to lint or dust. The presence of lint or dust picked from paper stock can cause halftone images to sharpen.	If due to picking, soften ink. If due to dust in stock, little can be done except to adjust the cylinder brush (if press is so equipped) and clean the blanket so that a minimum of dust will be picked up.
27. Ink does not print smoothly on sheet -----	a. Last color dried too hard to allow next color to gain a foothold.	In multicolor work, the use of cobalt drier should be avoided, especially on the first colors down. Trapping compounds can be procured which will aid in printing on surfaces which have poor attraction for ink. In jobs where colors overprint, it may be necessary to put some retarder in the ink so that the first color down will not dry before the succeeding colors are applied. The ink on all colors should be run as spare as possible.
	b. Under color is waxy or greasy -----	Keep reducing to a minimum in multicolor work
	c. Piling. Ink cannot distribute or flow properly, owing to excessive drier, poor vehicle, or heavy pigment.	Add long varnish to ink
	d. Hard-surface stock -----	Use trapping compounds
28. Mottled print, very similar in appearance to product of semiblind image, low blank	Ink too stiff. Ink of high cohesiveness and/or low viscosity will tend to adhere to itself and to the	Do not confuse with other difficulties listed in Difficulty column which have a similar appearance.

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ket, or insufficient impression cylinder pressure.	rollers, and will not transfer properly from rollers to plate, plate to blanket, or blanket to stock.	To remedy, thin ink with No. 00 varnish
29. Stock fibers, or bits of stock coating, picked from stock surface.	a. Ink too tacky. Inks are usually made fairly stiff, so that they will not be too greasy on strong-surfaced paper. b. Low humidity resulting in static electricity. c. Caused by the sharp bend in the stock, as it peels off the tacky blanket. d. Lint from trimmings laying between sheets	Use a hard blanket, minimum back cylinder pressure, and reduce tack of ink. To reduce ink tack, use beeswax or No. 00 varnish. Relative humidity around press should be at least 60 percent to prevent plucking. See item 40c for ways of raising pressroom humidity. Soften the ink with a commercial nonoffset compound. Use a hard blanket and a minimum of back cylinder pressure. Clean blanket surface to reduce tack. Reset cylinder brush assembly
30. Paper sticks to blanket	Blanket tacky or dirty	Clean blanket thoroughly, and powder with a half-and-half mixture of talcum powder and flowers of sulfur. Or install new blanket.
31. Stock wrinkles under pressure. Usually associated with thin stocks.	Usually due to poor condition of stock May be aggravated by poor guide or gripper adjustments.	Check settings of guides, undertongues, and grippers. Cut across-the-cylinder notches in the blanket packing to help relieve the offending pressure. Prerun paper conditioning usually eliminates this wrinkling deficiency.
32. Old work shows through as ghost image	a. Plate may be insufficiently grained to remove old work. b. Blanket embossed, owing to poor cleaning	Use snakeslip and plate etch to remove old work from plate. If condition is too severe, replace plate. Replace with new blanket and hang old one up to dry after reconditioning. Every press should have an extra set of blanket bars so that blankets can be periodically rested. This prevents embossing and greatly increases the life of the blanket.
33. Pinholes at same place on each sheet	Due to improper manufacture of rubber blanket, causing pits in the rubber skim coat.	Replace blanket.
34. Checked appearance at edges	Cracked form rollers, due to improper washup. Occurs especially at ends of rollers.	Replace affected rollers. Rollers must receive regular thorough cleaning to prevent cracking and pitting.
35. Excessive wastage	Improper procedure	Wastage in makeready can be greatly decreased in the following way: In the preliminary operations of checking color and position, manipulate the feeder so as to feed and print only one sheet at a time.
36. Image has incorrect, although parallel, margins on printed sheet.	Imperface or incomplete makeready	Swing plate, adjust front guides (for small movement only) and/or move side guide as required.
37. Image not parallel on printed sheet	Imperfect or incomplete makeready	Twist plate or parallel front guides. Since even the best of platemakers make mistakes, the pressman will find it a great timesaver, in the long run, if he checks each plate before mounting to see if the image is centered and parallel to the gripper edge. If the image is correct, the loss of time is negligible; but if the image is crooked, he

Difficulty	Cause	Remedy
38. Register varies during run. Image does not print in the same place on every sheet.	Imperfect or incomplete adjustment, usually of feeder assembly.	can mount the plate crooked to compensate for the error, and save a good deal of makeready time. Check the following press components or adjustments: pile too high; feeder back bar and rear pile finger binding the corners of the feeding sheet; airblast so great that it floats the sheet backwards; Wale floating nozzle laying heavily on edge of sheet; two-sheet choke binding one sheet; trolley wheels set too tight or with varying tension; register brushes and wheels permit sheet to bounce backwards at headstops; tension of individual conveyor tapes varies; trip lever binding on the feeding sheet; headstops pinching gripper edge of sheet; setting of headstops too great, permitting sheets to buckle; register drop bar pressure too great, causing a drag on the side guiding; or the sheet slips in the bite of the impression cylinder grippers. Never change press speeds once a multicolor map has started.
39. Image long or short on printed sheet in direction of press rotation (around cylinder only).	a. Stretch or shrinkage of negative ----- b. Paper stretch or shrinkage on previous press runs ----- c. Incorrect underpacking of plate and/or blanket ----- d. Incorrect underpacking of plate and/or blanket resulting from image size changes from previous run and also possible blanket swelling due to chemicals used.	Correction can be obtained (in direction of press rotation only) by increasing packing under plate and removing packing of equal thickness from beneath blanket to shorten image. (Reverse procedure if a longer image is desired.) Each .001 inch of packing changed will cause a change in the size of the image of from .008 to .012 inch. This may lead to other press difficulties, so a choice must be made between degree of register desired as against amount of plate wear and slur that can be tolerated. If error is large, a new negative and/or plate may be necessary.
40. Image prints large or small in both directions.	a. Incorrect camera setting when making negative ----- b. Stretch or shrinkage of film negative ----- c. Humidity change in paper since previous press run -----	See item 39 for procedure of correcting size of image around cylinder. Remake plate from shrunken or stretched negative Maintaining constant humidity in paper is only effective prevention. Paper is in best condition for multicolor printing if its relative humidity is 5 to 8 percent higher than that of the pressroom air. Some correction is obtained (time permitting) by hanging paper, separating into small piles, or running through the press with or without dampeners against a blank plate depending on whether moisture is to be added or subtracted from the stock. Also, attempt to condition pressroom to agree with humidity at time of previous run. Hang wet rags in front of a fan, or boil water in vicinity of press to increase humidity.

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41. Local misregister at corners of sheet	Paper fanned out due to varying humidity around pile, use of excessive fountain solution or excessive back cylinder pressure during printing.	Condition paper. Stretching of plate at corners or local change of blanket underpacking may be attempted only as a last resort. Make as many corrections as possible before printing another sheet after checking the first one. When checking color and position under close tolerance, make up sandwiches or "books" of waste sheets, with only one good sheet in the center of each "book."
42. Failure to dry	a. High humidity. Drying is slower at a high humidity b. Too much waxy or greasy reducing compound used in ink. c. Stock surface too acid, owing to running a strong fountain solution on previous press runs, or chemical reactions between ink and drier on previous runs. d. Moisture content of stock is too high. Moisture retards drying. e. Too much or too acid a fountain solution is used. Moisture and acidity retard drying. f. Drier has reacted chemically with extender (alumina hydrate), rendering drier inactive. g. Stock unsuitable. Certain hard surfaced stocks will not trap or absorb the ink properly. h. Ink not suitable for paper i. Drier not thoroughly mixed j. Wrong drier used. On hard-surfaced paper where little absorption takes place, cobalt drier may form a surface skin which will prevent the ink underneath from drying. k. Too much drier used. Some paste driers, if an excess is used, soften the ink just like any other greasy compound. l. Temperature too low. The time needed for chemical reactions doubles with every 20° drop in temperature. m. Insufficient drier	- Use more drier, or allow more time - Stiffen ink with magnesia powder, or replace ink - Use more drier and a weaker fountain solution - Condition stock - Correct cause - Do not add drier to ink until just before using - Replace stock. Add commercial trapping compounds - Use care in mixing - Use care in mixing - Correct cause - Hang sheets or blow air through them. Or rerun through press with a drier spray, or overprint with a size that will provide additional nongreasy drier. - Drying will occur in time. Faster drying can be obtained by winding stock. - Increase amount of drier
43. Failure of ink to dry in center of sheets although dry at edges.	Lack of oxygen	Wind stock
44. "Spotty" drying	a. Stock is damp in spots. Usually associated with card-board. b. Ink film of previously printed colors is more absorptive than blank sheet. Occurs only if drier is insufficient except where absorption is great. c. Porosity of stock varies, owing to manufacturer's practice of taking the sheets from several different reels when making up reams.	- Condition stock - Hang or wind stock if greater speed is desired. Otherwise, the ink will dry eventually. - Mix ink to dry on least receptive sheet
45. Chalking. Vehicle soaks into stock, leaving pigment unbound to the surface.	Insufficient drier, high humidity, or excessive acid in the fountain solution. Setting time of ink is too	Chalking is usually noticed too late to correct the cause. However, the job can be saved by overprinting with a

Difficulty	Cause	Remedy
	short. If the vehicle is absorbed faster than the ink dries, there will not be enough binder left to hold the pigment, and chalking will result.	transparent size (alumina hydrate or overprint varnish —with drier), using the same press plate that was used to print the affected color. If two or more colors chalk, print size over the entire sheet, using a blank plate and without dampeners. Paper brightness will be slightly lowered, but usually not enough to harm the job. On similar future jobs, add drier and binding varnish.
46. Ink lightens in color during drying	On absorbent book paper or coated stocks, the ink is apt to lighten in color owing to absorption in drying. The harder the paper surface, the thinner the ink film need be. Normally, coated stock requires only $\frac{1}{2}$ to $\frac{3}{4}$ as much ink as uncoated stock. The softer the paper, the more vehicle it will absorb.	None. On future jobs of a similar nature, run a heavier film of ink, or mix ink tinctorially stronger.
47. Dead, lifeless appearance of ink on printed sheet.	Contrast between some types of stock and ordinary offset ink. Also, the water used in the lithographic process tends to soften the effect of a printed ink.	Use a gloss ink, and print with a minimum of water
48. Discoloration during drying	Cobalt drier is not compatible with certain ink pigments.	See inkmaker for advice
49. "Burning Out" or loss of color during drying.	Due to lack of oxygen. Solids or heavy halftones are most affected. Iron blue or chrome green inks are the usual offenders. Especially likely if a heavy ink film is run or if excessive water was used.	Wind stock as necessary during drying to supply oxygen to all sheets in pile.
50. "Scuffing." Ink dries, but still rubs, smudges, or scuffs easily.	Caused by ink containing too much of nondrying compounds. Such materials soften the dried ink film so that it will not stand rubbing, i.e., the varnish in the ink has dried, but the dried film is diluted with grease and remains somewhat soft. For ordinary work, more than 1 ounce of nondrying material per pound of ink will cause trouble.	Boxes, labels, and similar material should be printed in scuffproof ink. Even then, waxing or varnishing the printed sheets may be necessary.
51. Fading of colors within a few weeks or months after printing.	"Permanency" is only a relative term when applied to inks. Even the most colorfast inks retain their brilliance for only about 6 months when directly exposed to heat, light, etc.	None
52. Offsetting or sticking together of the sheets in the printed pile.	a. Running excessive ink b. Failure of ink to dry or set c. Use of excessive drier in ink	Reduce ink supply at fountain. Coated or hardfinished stock requires more drier, preferably cobalt, for single-color work. Add a varnish, compound, or drier to speed the setting time. When running a hard-surfaced paper or a paper coated both sides, it is wise to use drier judiciously. Driers

create heat in the printed pile, and both sticking and
offsetting may result.

Application of radiant heat, alpaheeting, or use of a spray
gun may be necessary. When running such stock, the
ink should be as tinctorially strong as possible to permit
running it spare. When starting a long run, remove
stock in small lifts until sure that there is no offsetting
due to weight of stock.

See item 4 for means of relieving static.

d. Static in stock

INSTRUCTOR NOTES

1. PAPER CYCLE

- a. Historical data: None
- b. Anecdotes: None
- c. Content: The instructor will discuss the problems and explain the solutions to some of the problems the student will encounter during their daily operating of the offset press. The problems areas most likely to be encountered during operation, are paper problems, feeding problems, registration and delivery of the printed sheet. With the use of sample folders the student will learn the causes and solutions to many of the problems he will encounter.
- d. Tactics: This lesson could be taught through the use of 35mm slides.

2. PRINTING CYCLE

- a. Historical data: None
- b. Anecdotes: None
- c. Content: The problems that the press operator will encounter will be discussed to include the four major assemblies. The instructor will provide solutions to problems that involve the dampening, inking, and cylinder assemblies of the press.
- d. Tactics: None

STUDENT ADVANCE SHEET

SUBJECT: Offset Printing

LESSON: Identify Printing Problems

OBJECTIVE: Provided with sample folders containing printed sheets, with designated problem areas, the student will identify, and discuss the problem and learn what corrective action, he as a pressman must take to eliminate the problem. Upon completion of this lesson, the student will be able to identify and cope with off-set press problems encountered in the daily operation of an off-set press.

STUDENT REFERENCES: The following assignments are to be accomplished prior to the lesson on Identify Printing Problems.

1. Study: Appendix E - Offset Press Problems; TM 5-245 (7-70), Offset Photolithography and Map Reproduction.
2. Complete Programmed Lesson - 83F20-C-010-030, Printing Problems.

SUPPLEMENTARY INFORMATION: Instruction in the area of printing problems will be accomplished in the following manner:

1. Conference (1 Hour)
 - a. Discuss problems encountered in Practice Printing I lesson.
 - b. Discuss solutions to printing problems.
2. The objective of this lesson is to teach the student how to identify and solve printing problems during his practical exercise lesson, print a three color map with a minimum of instructor assistance.

SOURCE MATERIALS

LESSON: Identify Printing Problems

1. Paper Cycle - TM 5-245

a. Paragraph 8-4, (2)

- (1) Appendix E - 3
- (2) Appendix E - 2
- (3) Appendix E - 4, a

b. Paragraph 8-4, (2), (a)

- (1) Appendix E, 1
 - (a) Appendix E - 1, b
 - (b) Appendix E - 1, b, f
 - (c) Appendix E - 1, d
 - (d) Appendix E - 1, e

(2) TM 5-245

- (a) Paragraph 8-10, c (1)
- (b) Paragraph 8-10, a (5)
- (c) Paragraph 8-10, c (9)
- (d) Paragraph 8-10, c (3)
- (e) Paragraph 8-10, c, 5-(b)
- (f) Paragraph 8-10, c, 5-(a)

(3) TM 5-245

- (a) Paragraph 8-13, a
- (b) Paragraph 8-13, b

2. Printing Cycle - TM 5-245

a. Sect VI

- (1) 8-19, d (1), (2)
- (2) Appendix E

b. Sect VII

- (1) 8-24, d, (1), (2)
- (2) 8-24, a, (3)

615

12/74

611

c. TM 5-245, Appendix E

- (1) Appendix E - 6, 14 - d, 19 - d, 24, 26 - d
- (2) Appendix E - 5-2, 14 - c
- (3) Appendix E - 10 - a, 17 - e, 26 - a

d. Appendix E

- (1) 8 - d, 25 - b, 39 - c, d
- (2) 21, 22 - a, 20 - a
- (3) 7 - a, b
- (4) 36, 37

- (a) 39 - a, b, c, d
- (b) 40 - a, b, c

e. Appendix E

- (1) 39 - c
- (2) Paragraph 8 - 16 d - (1) Thru (12)
- (3) Paragraph 8 - 16, 9- (1), (2)

f. Appendix E

- (1) 22, b
- (2) 5 - g, 8 - c

PROGRAMMED LESSON

PRINTING PROBLEMS

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INTRODUCTION

Long experience and a high degree of skill are required to make a good offset pressman. Even the best pressman has to contend with many variables over which he has no control. These include plates, blankets, ink and dampener rollers, inks, paper, and atmosphere conditions. During this program we will discuss briefly some of the more common problems encountered by the pressman.

OBJECTIVES OF LESSON

Upon successful completion of this programmed lesson, the student will be able to identify and cope with offset press problems encountered in the daily operation of an offset press.

INSTRUCTIONS TO STUDENTS

This programmed lesson presents the material in small, sequential steps called frames. Each frame contains information that you must know and understand. Read carefully each frame, then provide the required response. After responding, turn the page and check (do not merely copy) the accuracy of your response. If your initial response was correct, go on to the next frame. If your initial response was incorrect, re-read the frame before continuing. Beginning on page 1, follow the top level of frames to page 73; then return to page 1 and begin the bottom level, continuing in this manner until all the frames have been completed.

Remember, this lesson is not a test and will not be graded as such. The self-test at the end of the lesson is provided for your benefit. It offers a means whereby you can measure how well you learned the material presented in this text.

Now begin with Frame 1 at the top of page 1.

614

FRAME #1

There are several factors over which the pressman has little or no control, yet will affect his ability to produce top-quality work. Temperature, humidity and the condition of the working materials are some of these factors.

Three factors that will affect a pressman's ability to produce top-quality work are _____, _____ and conditions of the _____.

FRAME #38

Some of the causes of "blind" plates are plate cleaners, scratch removers, emulsified ink and too much acid in the fountain solution.

Repeated use of plate _____ and scratch _____ along with too much acid in the fountain solution, will cause the plate to become _____, due to losing its _____ receptivity.

619

615

1. temperature, humidity, working materials

38. cleaner, remover, blind, ink

630

616

FRAME #2

The temperature near the press has a considerable effect upon how the job must be run. It affects the ink-water balance, the drying speed of the ink and the characteristics of the paper. Closely related to _____ is humidity, both produce similar problems.

FRAME #39

All form rollers in the inking and dampening assemblies should be set so they are driven by the vibrator rollers and not the printing plate. Inking and dampening assembly form rollers should be driven by the _____ rollers and not the _____.

651

617

2. temperature

39. vibrator, printing plate

4

652

618

FRAME #3

Similar effects and problems are induced by _____ and
_____. However, humidity is even more difficult to control
than temperature. The problems temperature causes are faster drying
and evaporation.

FRAME #40

Loose settings of the form rollers will scrub and wear the
printing plate. Always check for proper settings. Improperly set
_____ rollers will _____ and _____ the printing plate.

653

619

3. temperature, humidity

40. form, scrub, wear

620

FRAME #4

High temperature causes the ink to _____ on paper and ink rollers. Dampening solution will dry faster on the plate and dampener rollers. Fountain solution will evaporate and cause the PH to change.

FRAME #41

If graying occurs while running the press, it is natural for a pressman to add more ink to get a heavier layer on the sheet. However, the cause is probably too much water and it should be cut back. In most cases, cutting back on water remedies grayed copy.

If graying occurs while running the press, we should first try cutting back on _____.

655

621

4. dry faster

41. water

622

FRAME #5

Fountain solutions will evaporate due to _____
and cause a change in the PH of the fountain solution.

FRAME #42

Scratches usually occur because of careless handling of the plate or by improper use of processing materials. Scratches can be removed by the use of scratch remover or plate etch and hone.

657

623

5. high temperature

42. No response

624

FRAME #6

The pressman must learn to make the best use of the raw materials furnished him, no matter what their condition. Poor quality inks, paper, blankets, rollers and even the chemicals used in fountain solutions will affect the quality of the finished product.

Whatever the conditions, the pressman must learn to make use of poor quality _____, _____ and _____. A good pressman will use all techniques available to him to counter the difficulties caused by poor quality working materials.

FRAME #43

To remove scratches, use either scratch _____ or plate _____ and hone. Do not allow scratch _____ or plate _____ to dry on image or blinding will result. Always wash treated areas with water or fountain solution.

659

625

6. ink, paper, blankets

43. remover, etch, remover, etch

660 12

626

FRAME #7

The offset pressman must be able to distinguish between good and poor quality printing. He must learn to use sound judgment. Therefore, as pressmen, we must learn to use good _____ in the work we produce and the adjustments we make.

FRAME #111

Plugging of the image during the press run is caused by too much or too soupy ink, dirty dampeners, paper, mechanical adjustments, printing pressure, improperly adjusted form rollers and a weak or improperly mixed fountain solution.

651

627

7. judgment

44. No response

11

662

628

FRAME #8

With the inexperienced operators, errors in _____ will be more prevalent than with experienced operators. The pressman, when making adjustments, must use good _____.

FRAME #15

What are some of the probable causes of plugging while running the press?

- a.
- b.
- c.
- d.

693

629

8. judgment, judgment

45. a. Ink
b. Weak fountain solution
c. Dirty dampeners
d. Form roller adjustment

630

FRAME #9

The largest portion of printing problems encountered by the student pressman will be caused by his own mistakes. They can be eliminated only through practice and experience. With the student the largest portion of their printing difficulties will be introduced by their own _____.

FRAME #46

Scumming is a condition that shows up on the press and the printed sheet while running the press. It is the result of the plate losing its water receptive surface and improper adjustments. Scumming results from the plate losing its water _____ and improper _____.

655

9. mistakes

631

46. receptive surface, adjustments

632

FRAME #10

To catch these _____, constant observation is needed. While the press is printing, the pressman must frequently pull sheets out of the delivery and examine them for imperfections.

FRAME #17

Catch-up results when the pressman runs an incorrect ink and water balance. Either the plate surface is too dry or so much ink is being carried that even the properly dampened background areas cannot repel it. Catch-up is the result of incorrect _____ and _____ balance.

657

633

10. mistakes

• 47. ink, water

634

FRAME #11

Probably the first indication of a printing difficulty will be the appearance of an _____ on the printed sheet.

FRAME #48

While running the press you encounter _____ that is caused by either an incorrect _____ and _____ balance or too much _____. An obvious correction would be to bring the amounts of ink and water into balance. There is nothing wrong with the plate.

659

11. imperfection

635

48. catch-up, ink, water, ink

636

FRAME #12

The inexperienced pressman will too often make snap judgment which will probably be incorrect. Too often a snap judgment by an inexperienced pressman will be _____.

FRAME #49

The modern offset blanket is the result of half a century of development and improvements. Offset blankets should contain the following properties and characteristics:

- a. Uniform thickness
- b. Resistance to stretch
- c. Resilience and firmness
- d. Ink receptability

671

12. incorrect

637

49. No response

638

FRAME #43

In correcting this imagined difficulty, he may only add to the real problem. For this reason, all printing difficulties which the student encounters should be studied systematically. Therefore, all printing problems should be analyzed _____.

(FRAME #50

Since the pressure between the plate and the blanket has to be maintained within thousandths of an inch, the blanket must have the uniform thickness over its entire area. The entire surface of the modern blanket must be of _____.

673

639

13. systematically

50. uniform thickness

640

FRAME #14

Systematically, the pressman can trace the difficulties back through the press until the difficulty has been localized. In systematically localizing the problem, we can divide the problem into five stages.

FRAME #51

The offset blanket must have uniform thickness over its . Any action by the pressman that destroys this uniformity will affect the quality of his printing.

675

14. No response

641

51. entire surface

642

FRAME #15

Localized problems can be divided into _____ stages. The five stages are as follows: sheet to blanket; blanket to plate; plate; dampening assembly; and inking assembly.

FRAME #52

An offset blanket is manufactured so that its stretch is minimized. Cotton is generally considered the most serviceable fabric for the backing because it is strong, stretch resistant, and flexible. Cotton is used for backing on the offset blanket because it is _____.

677

643

15. five

52. stretch resistant

644

FRAME #16

In the printed sheet-to-blanket stage, check the image on the blanket. If the problem does not appear on the blanket, then you have localized the problem. It is not in the _____ to _____ stage but in the feeder assembly, impression cylinder or the paper itself.

FRAME #53

Only the finest _____ material is used in weaving offset blankets. These fibers bonded together make the offset blankets resistant to _____.

679

16. sheet, blanket

645

53. cotton, stretch

650

646

FRAME #17

In the printed sheet-to-blanket stage, the problem can be traced to the _____ assembly, the _____ cylinder, or the _____ itself.

FRAME #54

Offset blankets must be resilient and firm enough so they can be depressed, yet firm enough so they will return to their original size without distortion.

Because of the pressure exerted by the .003 inch packing over the bearers the offset blanket must be _____ and _____ enough to return to its original shape.

691

647

17. feeder, impression, paper

54. resilient, firm

34

682

648

FRAME #18

In the blanket-to-plate stage, check the image on the plate. If the imperfection on the blanket does not appear on the plate, the difficulty must be in the transfer point. Perhaps the blanket has a low spot, is dirty or glazed.

When the problems occur on the blanket and not on the plate, the difficulty must be with the _____. The blanket may have a _____ spot, is _____ or _____.

FRAME #55

Modern offset blankets are known for their _____ and _____ because of the pressure exerted when packed over the bearers.

653

649

18. blanket, low, dirty, glazed

55. resilience, firmness

650

FRAME #19

If the problem also appears on the plate we must continue through the dampening and inking assemblies, and possibly all the way back to the original copy to trace the trouble.

Examine the plate in the area of the imperfection and check the _____ and _____ assemblies in line with the imperfection. If the trouble is not located in those stages continue to trace the trouble through the press until it is found.

FRAME #56

So far we have mentioned three characteristics of any offset blanket. There is one more called ink receptability. This is really the essential requirement of an offset blanket. The fourth requirement of an offset blanket is its ability to be _____.

635

651

19. dampening, inking

56. ink receptive

652

FRAME #20

The reason for this procedure is to systematically eliminate each possible source of trouble. Once an assembly is checked, it can be eliminated from consideration. This allows the pressman to localize, pin point and eliminate the trouble in one inspection and one series of adjustments.

FRAME #57

By being _____ the offset blanket must be able to take ink from the plate and deposit it onto paper. If the blanket surface becomes dirty, glazed or oxidized, it cannot satisfactorily accomplish this function.

657

653

20. No response

57. ink receptive

654

FRAME #21

There are four trouble areas on the press the operator must watch and listen for in order to recognize and correct printing difficulties before they seriously affect the quality of his work. The press operator must watch and listen to _____ areas on the press.

FRAME #58

A blanket that is _____, _____ or _____ cannot accomplish its function of being ink receptive.

689

41

21. four

655

58. dirty, glazed, oxidized

42

690

656

FRAME #22

The _____ trouble areas on the press are mechanical problems, feeder assembly, dampening assembly and inking assembly.

FRAME #59

The modern offset blanket must contain the following characteristics:

- a.
- b.
- c.
- d.

691

657

22. four

59. a. Uniform thickness)
b. Resistance to stretch)
c. Resilience and firmness) in any order
d. Ink receptability)

lll

692

658

FRAME #23

The first symptom of a mechanical problem will probably be a new sound. A pressman trains his ears to tell him something is wrong. If a student pressman suspects that something is wrong he should stop his press and find the problem.

A mechanical problem will probably show up on the press as a _____ sound.

FRAME #60

In order to obtain maximum performance and long life from blankets, it is necessary to know more about them than just how to put them on the press and take them off. We must consider some of the difficulties with which a pressman has to contend.

693

23. new

659

60. No response

46

694

660

FRAME #24

Feeder assembly troubles are many and diverse, but will usually result in the failure of the sheet to reach the head stops. Failure of the sheet to reach the head stops will be the result of _____ troubles.

FRAME #61

It is necessary to know that the rubber surface of the blankets begins to oxidize as soon as they are made and continues oxidizing very slowly as long as they exist. Also, that oxidation is the real weakness in blankets which affects both performance and life. Performance and life are affected by _____.

695

24. feeder assembly

661

61. oxidation

662
FRAME #25

Dampening assembly troubles usually result from faulty adjust-
ments. Usually troubles with the _____ assembly will result
from _____. These troubles will generally
appear on the printed sheet.

FRAME #62

Oxidation is hastened considerably by heat or direct sunlight.
Blankets should always be stored in a cool and shaded place because
_____ or _____ hastens oxidation.

697

25. dampening, faulty adjustments

663

62. heat, direct sunlight

50

698

664

FRAME #26

An alert pressman should be able to recognize dampening assemb. troubles since they usually appear on the _____ sheet as the result of _____.

FRAME #63

When a blanket becomes oxidized, its surface is glazed or hardened. When a blanket becomes _____ or _____ it should be washed with solvent and pumice powder. After it is cleaned, wash it with clean water.

699

26. printed, faulty adjustment

665

63. glazed, hardened

666

FRAME #27

The inking assembly troubles, like the dampening assembly troubles, will also show up on the printed sheet. Difficulties with the _____ assembly and the _____ assembly will appear on the printed sheet as the result of improper adjustments.

FRAME #64

Glazing, like plugging, can occur as a result of many reasons. Some of these are as follows: the absorption of some oils and driers, deposits of gum arabic or paper coating.

791

667

27. inking, dampening

64. No response

54

702

668

FRAME #28

The dampening and inking assembly difficulties will usually appear on the _____ and generally result from _____.

FRAME #65

The absorption of oils and driers, deposits of gum arabic or paper coating can cause a blanket to become _____. Such a blanket will fail to transfer ink correctly and in extreme cases the blanket must be discarded.

793

28. printed sheet, faulty adjustments

669

65. glazed

56

704

670

FRAME #29

In previous frames we discussed how problems on the printed sheet can be traced back through the press until the source of the trouble is located. Now we will discuss four characteristics of presensitized plates and techniques used to prevent and correct problems encountered by these plates.

FRAME #66

The absorption of oils by a blanket leads to another difficulty called embossing. This is a ghost image of a previously run job. It is absorbed by the rubber coating on the offset blanket. A ghost image that forms on a blanket is known as _____.

795

671

29. No response

66. embossing

672

FRAME #30

Most presensitized plates are grainless aluminum coated by the manufacturer with a thin sensitized coating. Presensitized plates are made of _____ aluminum and coated with a thin _____.

FRAME #67

Embossing can be remedied by a thorough cleaning with solvent and pumice powder. By using _____ and _____ we should be able to remedy embossing.

797

673

30. grainless, sensitized coating

67. solvent, pumice powder .

674

FRAME #31

Presensitized plate coatings are most sensitive to actinic light and least sensitive to red light, but require no special room for processing. No special room is required for processing presensitized plates but they are most _____ to _____ light.

FRAME #68

Absorption of oils leads to another problem which we call tackiness. Tackiness occurs when the surface of a blanket becomes sticky. Paper being printed will have a tendency to stick or cling to the surface of the blanket.

Paper sticking to the offset blanket, caused by the absorption of oils is called _____. Again wash and scrub with pumice powder to relieve this problem.

799

675

31. sensitive, actinic



68. tackiness



62

710

676

FRAME #32

The last characteristic to be discussed is the shelf life. Presensitized plates have a normal shelf life of six months to a year. Expiration dates are stamped on each package. Each package of presensitized plates has a date which gives its _____.

FRAME #69

In the previous frames we have found that the absorption of oils, solvents and driers cause _____, _____, _____ and _____.

711

677

32. shelf life

69. oxidation, glaze, embossing, tackiness

64

712

678

FRAME #33

The four characteristics of presensitized plates mentioned in previous frames are as follows:

- a.
- b.
- c.
- d.

FRAME #70

The offset blanket is stretched around a cylinder under considerable tension. A loose blanket will cause the image to vary in size resulting in misregister and streaks. Misregister and streaks are caused by a _____.

713

679

33. a. Grainless aluminum)
b. Sensitized coating)
c. Sensitive to actinic light) any order
d. Shelf life)

70. loose blanket

680

FRAME #34

The press life of a presensitized plate is dependent on many factors. Most of the reasons for short press life can be traced to the pressroom.

FRAME #71

Another problem with blankets is that they can get smashed while the press is on impression. Smashed blankets are caused by folded or crumbled sheets, half sheets, heavy ream markers, feeding two sheets, foreign matter and sheets sticking to the blanket.

715

681

34. No response

71. No response

68

716

682

FRAME #35

Improper printing pressure between the plate and blanket is one of the factors that will affect press life. One of the factors that will affect the life of a printing plate is improper _____.

FRAME #72

When a blanket is depressed so far that it will not return to its original shape, the blanket is said to be _____. A blanket can be repaired by placing patches of tissue under the low spots to bring them up to the level of the blanket surface.

717

35. printing pressure

683

72. smashed

70

718

684

FRAME #36

This improper printing pressure is caused by too much packing behind the plate and blanket. This packing will cause excessive squeeze and shorten plate life. Excessive squeeze on a plate is caused by _____.

FRAME #73

A blanket that is _____ can be repaired by placing _____ under the low spots to bring them up to the level of the blanket surface.

719

685

36. too much packing

73. smashed, tissue

72

720

686

FRAME #37

A plate is said to be "blind" when a strong image progressively loses ink receptivity. Loss of _____ receptivity indicates a plate is going _____.

YOU HAVE COMPLETED LEVEL A; RETURN TO THE BOTTOM
HALF OF PAGE 1 AND BEGIN ON LEVEL B

721

37. ink, blind

687

74

722

SELF-TEST

The following questions are provided to give you practice in using the information you learned from this text. You should be able to answer ALL questions correctly; but if you miss any, re-read the frame in which the answer to the question is found. The correct frames are indicated by the numbers in parentheses.

1. What are some of the sources of printing problems? (#1-11)
2. How should printing problems be analyzed? (#13)
3. What are the five stages of printing problems? (#15)
4. What is the first indication of a mechanical problem? (#23)
5. Will inking and dampening assembly problems show up on the printed sheet? (#27)
6. What are the characteristics of a presensitized plate? (#30-33)
7. What is meant by a blind plate? (#37)
8. What causes scratches? (#42)
9. What causes plugging? (#44)
10. What does scumming result from? (#46)
11. What are the four characteristics of an offset blanket? (#49)
12. What causes glazing? (#64)
13. What is embossing? (#66)
14. What causes tackiness? (#68)
15. What problem is caused by the absorption of oils, solvents and driers? (#64-68)
16. How is a smashed blanket repaired? (#72)

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LESSON PLAN

PRINT A FIVE-COLOR MAP AND PHOTOMAP

740-303-B-030-010

OFFSET PRINTING



February 1975

DEFENSE MAPPING SCHOOL — FORT BELVOIR, VIRGINIA

724

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740-303-B-030-010

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740-303-B-030-010

ORIENTATION SHEET

OFFSET PRINTING

SEGMENTSBLOCKSLESSON

Press Fundamentals
(10 1/2 Hours)

OFFSET PRESS
OPERATING PROCEDURES
(172 Hours)

Makeready and Operational
Procedures (37 Hours)

Three Color Map Exercise
(48 Hours)

FIVE COLOR MAP EXERCISE
(64 Hours)

PRINT A FIVE-
COLOR MAP AND
PHOTOMAP
(64 Hours)

Bindery and Practice
Printing II (23 Hours)

LESSON REQUIREMENTS SHEET

COURSE: Offset Printing

LESSON: Print a Five Color Map and Photomap

OBJECTIVE: Provided with an offset press (LIG or ATF-DP), necessary tools and supplies, a list of safety rules, TM 5-245 and the Harris Operators Manual, the student will perform the proper make-ready, operational and wash-up procedures to print a five color map on one side of a sheet and a photomap on the other side. This is a sixty-four hour graded practical exercise to be accomplished in accordance with procedures outlined in the manuals and student advance sheet provided. The student must achieve a grade of 70 on each part of this exercise to successfully complete the course.

TIME: 64 Hours: 64 PE

TRAINING AIDS AND DEVICES:

1. Audio-Visual Aids or Devices: None
2. DA Training Aids: None
3. Service Training Aids: None

MATERIALS AND SUPPLIES:

- | | |
|---------------------------------------|------------------------|
| 1. Map stock | 500 sheets per student |
| 2. Black, red, brown, blue, green ink | As required |
| 3. Oil can w/OE 30 oil | 1 per press |
| 4. Gum | As required |
| 5. Etch | As required |
| 6. Rags | 5 per press each day |
| 7. Plates | 6 per student |

EQUIPMENT:

1. Offset Press
 - a. ATF Chief 29 (DP) press One per designated student group
 - b. Harris LIG press One per designated student group
2. Offset press tools 1 set per press

TRAINING AREA:

Indoor: 1. 30-man classroom equipped with desks, chairs & chalkboard.
2/75

692

2. Pressroom equipped with one offset press and work bench with tool set for each group of designated students.

Outdoor: None

TRANSPORTATION REQUIREMENTS: None

ADDITIONAL PERSONNEL AND DEMONSTRATION TROOPS:

1. Demonstration: None
2. Practical Exercise: Six assistant instructors.

TEXT REFERENCES:

1. Instructor References: TM 5-245 (7-70), Offset Photolithography and Map Reproduction, Chap 8 and Appendix E.

Harris Operators Manual.

2. Student References: TM 5-245 (7-70), Offset Photolithography and Map Reproduction, Chap 8 and Appendix E.

Harris Operators Manual.

3. Average Student Homework Time: 2 Hours

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740-303-B-030-010

LESSON OUTLINE

LESSON: Print a Five Color Map and Photomap

TIME	SUBJECT MATTER OUTLINE	INSTRUCTIONAL TACTICS
	<u>INTRODUCTION</u> 00:00 In the previous lesson, PRINT A THREE-COLOR MAP, you had the chance to practice print multiple color maps. This graded lesson, PRINT A FIVE-COLOR MAP AND PHOTOMAP, is designed to thoroughly test your ability to operate an offset press. The requirements are to print a five color map and photomap, maintaining color density, making register marks for each color, on the initial color you will maintain image position from side to side and parallel to the gripper edge of the sheet. You should frequently inspect the map sheets in order to check on map quality. Each color will be graded on its own merit. Grading will be accomplished in the same manner in which your three-color map was evaluated and critiqued. Once again the instructors will be very critical on safety as it is imperative that you follow safety precautions. The map that you will print is a standard topographic map and although it is difficult to print it is no more so than a normal map requirement. The photomap you will be required to print is a large single color map. The main difficulty with this is the fact that it is primarily a large halftone which means that correct balance of water and ink is important. A "flat" or "washed out" image is not acceptable. The results of your work in this lesson are most important to you because it is the final test of your ability as an offset pressman in this course.	NOTE: Inform the students that they will continue to operate the same press originally assigned to for completion of this graded exercise.

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TIME	SUBJECT MATTER OUTLINE	INSTRUCTIONAL TACTICS
	<u>DEVELOPMENT</u>	
00:05	1. PRINT A FIVE-COLOR MAP AND PHOTOMAP a. Purpose b. Requirements (1) Black (Culture) (2) Red (Road fill) (3) Brown (Relief) (4) Blue (Drainage) (5) Green (Vegetation) (6) Photomap (Black) c. Materials and supplies d. Performance	Explain the purpose of this PE, requirements, of each feature including color density, quality control, registration and performance standards. Discuss the peculiarities of printing a photomap. Check student understanding by asking questions. Give time allotted to complete the PE. SEE ANNEX.
00:30	2. ADDITIONAL REQUIREMENTS a. Job evaluation b. Safety procedures c. Supply economy (QUESTIONS AND COMMENTS PERIOD)	Explain grading procedures, getting OK sheet prior to press run. Re-emphasize safety procedures. Photomap will be printed on the back of the five-color map to conserve map stock. Check student understanding.
		BREAK AT INSTRUCTOR'S DISCRETION
	<u>APPLICATION</u>	
		Tie-in to previous period. Student understanding of procedures is to be checked. thru-out the lesson. See instructional tactics. Students will alternate as press operator after

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TIME	SUBJECT MATTER OUTLINE	INSTRUCTIONAL TACTICS
		each color is printed. See ANNEX C for time allowed for each color and grading procedure. 6 1/2 hr. Graded PE.
		BREAK AT INSTRUCTOR'S DISCRETION
63:45	<u>SUMMARY</u> You have just completed your final graded practical exercise which has been geared to test your ability to print a multiple color map and photomap. If you have been successful in accomplishing this then you can consider yourself as being well on your way towards being a skillful offset pressman. You have had to meet the high performance standards required of military map printing. This lesson has been the summation of all the knowledge and skill that you have acquired through-out this course. More important than any grade you received for the map printing project is the experience gained. The theory is that if you can successfully print a multiple color map and photomap then you should be able to print any job that you are assigned to do. Each of you has had individual critiques along with the grading so mistakes could be cleared up. In your next lesson, MULTILITH PRESS 1250, you will have an opportunity to operate a smaller type offset press.	

INSTRUCTOR NOTES

1. PRINT A FIVE-COLOR MAP AND PHOTOMAP

- a. Historical data: See Volume 1909 Professional Memoirs, the Article on "Lithographic Map Reproduction in the Field" by Lt. John A. Holabird.
- b. Anecdotes: The military topographic map is used extensively for training purposes, for making troop movements, and planning combat operations. It is one of the most useful devices a commander has to work with. The major advantage of a standard topographic map is the impact that color has on the user. Features are readily discernible. The number of colors used is determined by several factors. The area being mapped must be considered. Examples of this would be areas of dense jungle in which there are no roads or cities therefore red would not appear on the map with the only exception being if a boundary exists in that area. Another example would be desert areas that have no drainage features therefore blue would not appear on the map.

Photomaps are special map supplements that are usually printed in one color. Some photomaps have been printed in which two additional colors were used for important features. These color intensified photomaps were printed for certain areas of Viet Nam and had red overprints to indicate hamlets and blue overprints to represent drainage features. More specialized training is required to read photomaps. A photomap is a montage of aerial photos printed as a halftone. Grids may be superimposed on photomaps.

- c. Content: The instructor will explain and discuss the proper procedures to follow and the printing sequence that must be followed, materials required to complete the exercise and what is expected of the student to properly complete the exercise. The instructor will explain what to look for during the lesson pertaining to registration, ink coverage and the application of proper procedures and safety precautions.
- d. Tactics: None

2. ADDITIONAL REQUIREMENTS

- a. Historical data: None
- b. Anecdotes: In the training of a topographic printer the instructor is responsible for job evaluation. The student must be made aware of the fundamental requirements of map image position, correct color density, registration of individual features, as well as a possible need to back-up the map. Medium scale maps often require a yellow plate which entails extremely good wash-up in order to maintain proper color density.
- c. Content: The instructor will explain the method of evaluating the printed work, grading procedure and economy in the use of paper and other materials.
- d. Tactics: None

3. EXPLANATION

This lesson was last systems engineered 25 May 1970.

STUDENT ADVANCE SHEET

LESSON: Print a Five Color Map and Photomap

OBJECTIVE: Provided with an offset press (LIG or ATF-DP), necessary tools and supplies, a list of safety rules, TM 5-245 and the Harris Operators Manual, the student will perform the proper make-ready, operational and wash-up procedures to print a five color map on one side of sheet and a photomap on the other side. This is a sixty-four hour graded practical exercise to be accomplished in accordance with procedures outlined in the manuals and student advance sheet provided. The student must achieve a grade of 70 on each part of this exercise to successfully complete the course.

STUDY REFERENCES: The following reading assignments are to be accomplished before and during the printing exercise.

TM 5-245 (7-70), Offset Photolithography and Map Reproduction, Chap 8 and Appendix E.

Harris Operators Manual.

SUPPLEMENTARY INFORMATION: The instruction for this requirement will be accomplished in the following sequence:

1. Explanation of lesson (1 Hour)
 - a. Sequence to follow in printing of map.
 - b. Grading system.
 - c. Duties of operator being graded.
 - d. Duties of assistant operator.
2. Student graded practical exercise (64 Hours) (Each student will be allowed 32 hours to complete the graded exercise).
 - a. Make a visual safety check of press.
 - b. Complete daily scheduled maintenance (lubrication).
 - c. Observe all safety rules.
 - d. Complete the make-ready procedure for the scheduled color.
 - e. Print the required number of good copies.
 - f. Participate in press wash-up when both students complete assigned scheduled color.

STUDENT PRACTICAL EXERCISE

LESSON: Print a Five Color Map and Photomap

OBJECTIVE: Provided with an offset press (LXG or ATF-DP), necessary tools and supplies, a list of safety rules, TM 5-245, Harris Operators Manual and the student advance sheet, the student will perform safety check of press, make-ready, operational procedures to print a clean, error free five color map with back-up photomap and perform required press wash-up. All requirements will be accomplished under the observance of the instructor grading the exercise.

MATERIALS AND SUPPLIES REQUIRED:

- | | |
|---|------------------------|
| 1. Map stock | 500 sheets per student |
| 2. Ink, black, red, brown, blue & green | As required |
| 3. Oil can w/OE 30 oil | 1 per press |
| 4. Gum | As required |
| 5. Etch | As required |
| 6. Solvent | As required |
| 7. Rags | 5 per press per day |
| 8. Plates | 6 per student |
| 9. DMS ink color chart booklet | 1 per press |

EQUIPMENT:

1. ATF Chief 29 (DP) press
2. Harris LXG press

FACILITIES REQUIRED:

Pressroom equipped with an offset press, work table and tool set for each designated group of students.

TRANSPORTATION REQUIREMENTS: None

ADDITIONAL PERSONNEL: One instructor per two presses.

STUDENT REQUIREMENTS:

1. The student will perform a visual and manual safety check of the press.
2. The student will properly lubricate the press.
3. Student will prepare the press for operation as outlined in previous instruction. Student will be provided with 500 sheets of map stock with a normal allowance for waste of 50 sheets per color.

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4. Student will operate the paper cutter and trim the map stock according to previous instructions observing all safety precautions.
5. One student will perform as press operator, printing each color of his job. Total allotted time for each student to complete the exercise is 32 hours. The other student assigned to the press will assist the operator as press helper in any task except adjustment or operation of the press.
6. The first color, black map culture, the student will center the image from side to side and parallel to the gripper edge, make register marks on the plate, and any deletions or additions that are required. Color coverage and density must be in accordance with the DMS ink color guide. Registration of each color must be within a tolerance of 0.02 of an inch. When these requirements are completed the student will take a map sheet to the instructor for a check prior to making the press run. This procedure will be followed for each color.
7. Upon completion of each color the student will have his work evaluated and critiqued by the instructor. The work will be graded by the instructor using the exercise grading sheet (Appendix 1 to the Student Practical Exercise).
8. While the work of the first student is being graded and the student critiqued, the second student will prepare the press for printing if the color ink on the press is the same for the other students requirement. If color must be changed both students wash-up and prepare the press for the next color.

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Appendix 1 to
Student Practical Exercise
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5 COLOR MAP (BLACK AND PHOTOMAP)

STUDENT ALLOTTED TIME: BLACK - One day
PHOTOMAP - One half day

1. GRADING ON PRESS

- a. (1) Did not measure image on plate-----(-6)
- (2) Successfully completed (1) above but failed to measure image on printed sheet-----(-4)
- (3) Successfully completed (1) and (2) above but failed to shift packing properly-----(-3)
- (4) Successfully completed (1), (2), and (3) above but failed to measure image on South neat line-----(-1)

b. One point per each five (5) minutes up to 25 minutes

2. GRADING BY PRIMARY INSTRUCTOR

- a. (1) Gear Side-----(-3) SLIGHT MODERATE POOR
- (2) Operator Side-----(-3) -1 -2 -3
- (3) Side Guide-----(-3)
- b. (1) Correct Position-----(-2)
- (2) Correct Size-----(-2)
- c. (1) Parallel of image to gripper edge of sheet-----(-2) Movement of image up to 1/16 " (-1)
- (2) Center of image side to side-----(-2) Movement of image over 1/16 " (-2)
- (3) Center of image gripper to trail edge of sheet-----(-2)
- d. (1) Too Light-----(-4)
- (2) Too Dark-----(-4)
- (3) Uneven color over sheet-----(-4)
- (4) Scum-----(-4)
- e. (1) Scratches-----(-2) Following constitutes removal of only one point
- (2) Low spots-----(-2) 1. Visibility not distracting
- (3) Marks-----(-2) 2. No more than three defects noted
- (4) Finger prints-----(-2)
- f. (1) 1 to 50 sheets over the allotted 50 sheets-----(-2)
- (2) 51 or more sheets over the allotted 50 sheets-----(-4)

0-25%	26-50%	51-75%	76-100%
-1	-2	-3	-4

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TOTAL	50
-------	----

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5 COLOR MAP (Red, Brown, Blue, Green)

STUDENT ALLOTTED TIME: Red-One full day ---Brown, Blue, Green-One half day each.

1. GRADING ON PRESS

- a. (1) Twist-----(-4) Two free moves on
 (2) Swing-----(-4) Twist and Swing
 (3) Improper image size around cylinder-----(-4)

b. One point per each five (5) minutes up to 25 minutes.

2. GRADING BY PRIMARY INSTRUCTOR

- a. (1) Gear Side-----(-3) SLIGHT MODERATE POOR
 (2) Operator Side-----(-3) -1 -2 -3
 (3) Side Guide-----(-3)

- b. (1) Correct Position-----(-2)
 (2) Correct Size-----(-2)

- c. (1) Too light (overall)-----(-4)
 (2) Too dark (overall)-----(-4)
 (3) Uneven color over sheet----(-4)
 (4) Scum-----(-4)
- | 0-25% | 26-50% | 51-75% | 76-100% |
|-------|--------|--------|---------|
| -1 | -2 | -3 | -4 |

- d. (1) Scratches-----(-2) Following constitutes removal of only one point
 (2) Low spots-----(-2) 1. Visability not distracting
 (3) Marks-----(-2) 2. No more than three defects noted
 (4) Finger prints-----(-2)

- e. (1) 1 to 50 sheets over the allotted 50 sheets-----(-2)
 (2) 51 or more sheets over the allotted 50 sheets-----(-4)

SOURCE MATERIALS

LESSON: Print a Five Color Map and Photomap

1. Print a Five Color Map and Photomap - TM 5-245 (7-70), Offset Photolithography and Map Reproduction
 - a. Paragraphs 1-1 & 1-4
 - b. Paragraph 8-28 (j)
 - c. Paragraph 8-28 (a)
 - d. Paragraph 8-28
2. Additional Requirements - TM 5-245 (7-70), Offset Photolithography and Map Reproduction
 - a. Paragraph 8-28 (l)
 - b. Paragraph 8-2
 - c. Paragraph 8-28 (k)

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LESSON REFERENCE FILE

MULTILITH PRESS, MODEL 1250

T.440-122



FEBRUARY 1969

US ARMY ENGINEER SCHOOL - FORT BELVOIR, VIRGINIA

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TABLE OF CONTENTS

SECTION I	- Lesson Support Requirements
SECTION II	- Lesson Outline
SECTION III	- Source Material
ANNEX A	- Student Advance Sheet
ANNEX B	- None
ANNEX C	- Student Practical Exercise

NOTE: This LRF serves as the source of information for all lessons taught on this subject, though length, methods, and objectives will vary with courses. The specific length, methods, and objectives will be determined by the POI and so reflect in ILPs.

This publication supersedes LRF, T.440-122 (7-62),
MULTILITH PRESS 1250.

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SECTION I
LESSON SUPPORT REQUIREMENTS

SUBJECT: Offset Press Operation

LESSON: Multilith Press 1250

TRAINING AIDS AND DEVICES:

1. D. A. Training Aids: None
2. Service Training Aids: None

MATERIALS AND SUPPLIES:

1. Ink
2. Paper
3. Press plates
4. Tools

EQUIPMENT: Press, Multilith, (Model 1250)

FACILITIES:

1. Classroom: None
2. Training Area Facilities: Pressroom, PE

ADDITIONAL PERSONNEL AND DEMONSTRATION TROOPS:

1. Assistant Instructor(s): One
2. Demonstration Troops: None

TEXT REFERENCES:

1. Required References:
LRF T.440-122 (2-69), Multilith Press 1250, Section III.
2. Excerpted References:

Extracts from the Reference Manual, Multilith Offset, Model 1250 with single lever control 1965, is printed with written permission of the Addressograph Multigraph Corporation for use for military purposes and are not for sale.

SECTION II
LESSON OUTLINE

SUBJECT: Offset Press Operation

LESSON: Multilith Press, Model 1250

TIME PERIOD (TOTAL): 8 Hours

TYPE OF LESSON: Demonstration (1 hour) P.E. (7 hours)

OBJECTIVE(S): To provide the student with a working knowledge of the operation, capabilities, preventive maintenance, and safety precautions pertaining to the Multilith Press, Model 1250.

SUPPORT REQUIREMENTS: Refer to SECTION I

STUDENT REFERENCES: Refer to Schedule of Instruction

INTRODUCTION

00:00 So far in the offset press course, you have studied the operation and adjustment of a large offset press. Today we are going to demonstrate a smaller offset press which works on the same principle as the larger one. The "1250" has the capabilities of printing on 13-lb bond paper up to 3-ply card stock. It is important to know and understand this smaller offset press because of its capabilities and extensive use throughout the various services. It is used very extensively to reproduce forms, books, orders, and other related material. One day, at your new assignment, you may be running one of these smaller offset presses. We are first going to explain the operating controls and adjustments of the press and then present an actual demonstration. NOTE: point out to the students that the "1250" is not an item of the engineer set and is found primarily in an AG plant.

00:02 During the demonstration look for the answers to the following questions:

1. What are the stock and image sizes?
2. What is the function of the press controls?
3. How does the feeder operate?

4. What are the components of the cylinder assembly?
5. What are the components of the dampening assembly?
6. What are the components of the inking assembly?
7. How is preventive maintenance performed?
8. What are the necessary safety precautions?

DEVELOPMENT

- 00:04 1. STOCK AND IMAGE SIZES
- a. Minimum stock size
 - b. Maximum stock size
 - c. Maximum image size
- 00:06 2. ELECTRICAL CONTROL AND SPEED
- a. Power switches
 - b. Speed
 - c. Drive motors
- 00:08 3. FEEDER OPERATION
- a. Paper capacity
 - b. Starting and stopping
 - c. Pile height
 - d. Solenoid two sheet choke
 - e. Air blast nozzles and pull-in wheels
 - f. Conveyor board
 - g. Stop fingers and side guide
 - h. Upper and lower feed rollers
 - i. Cylinder grippers and ejector wheels
 - j. Delivery
- 00:16 4. CYLINDER ASSEMBLY
- a. Plate cylinder
 - b. Blanket cylinder
 - c. Impression cylinder
- (1) Trip mechanism
 - (2) Pressure adjustment

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00:24 5. DAMPENING ASSEMBLY

- a. Water pan
- b. Ductor roller
- c. Oscillating roller
- d. Water form roller
- (1) Covering
- (2) Paralleling
- (3) Plate pressure

00:32 6. INKING ASSEMBLY

- a. Ink fountain and keys
- b. Ductor roller
- c. Oscillating rollers
- d. Rider rollers
- e. Form rollers
- (1) Description
- (2) Paralleling
- (3) Pressure

00:40 7. PREVENTIVE MAINTENANCE

00:44 8. SAFETY

00:46 9. CRITIQUE

- a. Repose key questions
- b. Clarify any misconceptions

(QUESTIONS AND COMMENTS PERIOD)

SUMMARY

- 00:48
- 1. Stock and Image Sizes
 - 2. Electrical Control and Speed
 - 3. Feeder Operation
 - 4. Cylinder Assembly
 - 5. Dampening Assembly
 - 6. Inking Assembly
 - 7. Maintenance
 - 8. Safety
 - 9. Tie-in to Practical Exercise

00:50 BREAK

01:00 - 08:00 STUDENT PRACTICAL EXERCISE
(Refer to ANNEX C)

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SECTION III
SOURCE MATERIAL
MULTILITH PRESS MODEL 1250

INTRODUCTION

So far in the offset press course, you have studied the operation and adjustment of a large offset press. Today we are going to demonstrate a smaller offset press, which works on the same principles as the larger one. The 1250 has the capabilities of printing on 13-lb bond paper up to 3-ply bristol. It is important to know and understand this small offset press, because of its capabilities and extensive use throughout the various services. It is used extensively to reproduce books, orders, and other related material. One day, at your new assignment, you may be running one of these smaller offset presses. We are first going to explain the operating controls and adjustments of the press and then present an actual demonstration.

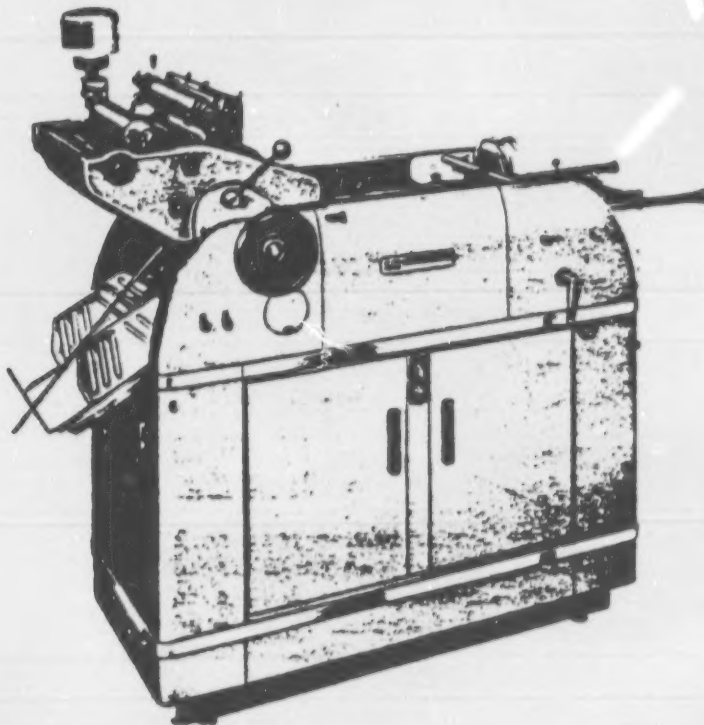


FIGURE 1

MULTILITH OFFSET PRESS, MODEL 1250

DEVELOPMENT

1. STOCK AND IMAGE SIZES

a. Minimum stock size. The minimum stock size that can be run on the Multilith, Model 1250 is 3 x 5 inches. When setting up the press for this size stock use the right side of the feeder and conveyor board as the press is equipped with only one impression finger. This finger is located on the right side between the upper and lower feed rolls.

b. Maximum stock size. The maximum stock size that can be run on this model is 10 x 15 inches. (On earlier models, the maximum stock size was 10 x 14 inches.)

c. Maximum image size. The maximum image that can be reproduced on this press is 9 3/4 x 13 inches. When computing what size sheet is to be run for any job, allow 1/4 inch on the top of the sheet for the gripper. This is the area where the sheet is gripped while printing and no printing will appear.

2. ELECTRICAL CONTROL AND SPEED

a. Power switches. There are two electrical switches; one controls the main drive motor and one controls the vacuum pump. Only one electrical cord is needed and can be plugged into any 110 volt AC receptacle.

b. Speed. Average speed of this model is 5500 impressions per hour. The minimum speed is 350 IPH and maximum speed is 7500 IPH.

c. Drive motors. The main drive motor is rated 1/2 horse power; the vacuum pump motor is rated at 1/3 horse power.

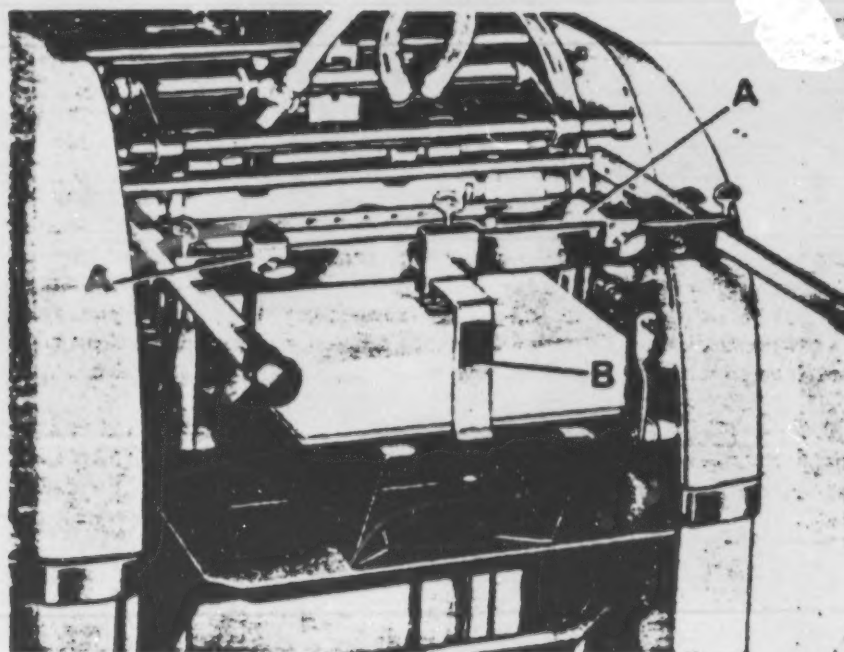
3. FEEDER OPERATION

POINT OUT THE FOLLOWING ON THE PRESS

a. Paper capacity. The feeder (Figure 2) will hold 5000 sheets of 20 lb. bond paper. The paper is held in the feeder square by paper side guides (Figure 2A), a tail guide (Figure 2B) which can be removed easily for re-loading and right and left vertical magazine guides (pile guides).

b. Starting and stopping. The feeder is started and stopped manually. If for any reason the paper jams up in the press during operation, the feeder will not go off automatically.

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Paper Magazine (Feeder)

Figure 2

c. Pile height. The height of the pile is controlled by a knurled knob on the operator side in the rear of the press. To raise the pile, the knob is turned counter-clockwise and to lower the pile, the knob is turned clockwise.

d. Solenoid two sheet choke. A solenoid micro switch is stationed at the rear of the press to detect double sheets. If two sheets are picked up, the switch is engaged and the two sheets are fed into a tray under the conveyor board.

e. Air blast nozzles and pull-in wheels. One air blast nozzle is positioned on each side of the pile near the front. The sheets are picked up by two suction feet and are then sent forward by two rubber pull-in wheels which are adjustable for more or less pressure by means of two knurled knobs located on the same shaft as the pull-in wheels.

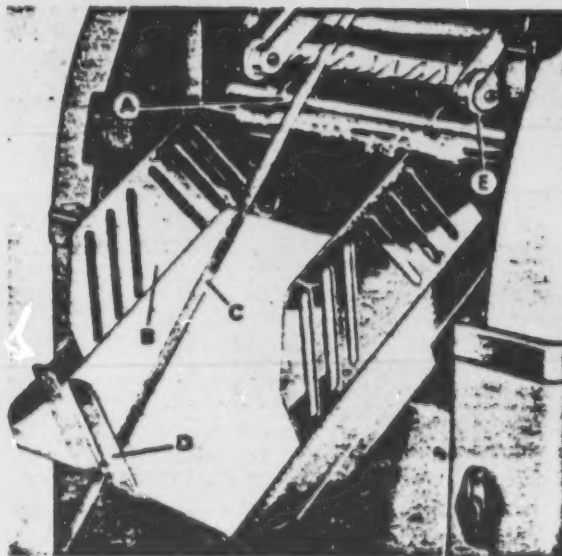
f. Conveyor board. The sheets are forwarded down the conveyor board by means of endless tapes and metal bands.

g. Stop fingers and side guide. The sheets are stopped in the registering mechanism by means of three stop fingers which are adjustable up or down for different thicknesses of stock. At this point, when properly adjusted, the side guide operates and pushes the sheet over, approximately 1/8 of an inch.

h. Upper and lower feed rollers. After the sheets are positioned by the side guide, they are forwarded into the cylinder grippers by means of an upper and lower feed roller. The lower feed roller is paralleled to the upper feed roller by means of an eccentric screw on the operator side of the press. For the thickness of stock being run, the upper feed roller is adjusted to the lower feed roller after the lower roller is paralleled.

i. Cylinder grippers and ejectors wheels. The cylinder grippers release the sheets and the ejector wheels (Figure 3E) and rings (Figure 3A) carry the sheet forward into the delivery tray.

j. Delivery. The delivery (Figure 3) holds 500 sheets of 20 lb. bond paper. The rear and one side (Figure 3B) of the delivery act as jogger blades to keep the pile in a neat stack during operation.



Paper Receiver (Delivery)

Figure 3

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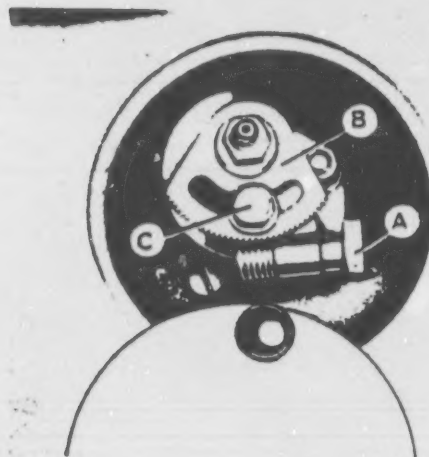
4. CYLINDER ASSEMBLY

a. Plate cylinder. The plate cylinder on the "1250" has no bearers. If more or less pressure is required between the plate and blanket cylinder, a lock nut on the impression handle is loosened and the handle turned down for more pressure and up for less pressure. To put the image on the blanket cylinder and in turn on the paper being run, this same handle is turned down when the press is started during operation. The tail clamp on the plate cylinder works on springs and is called a speed clamp. (See Figure 4.)



SPEED CLAMP

FIGURE 4



IMPRESSION CYLINDER ADJUSTMENT KNOB

FIGURE 5

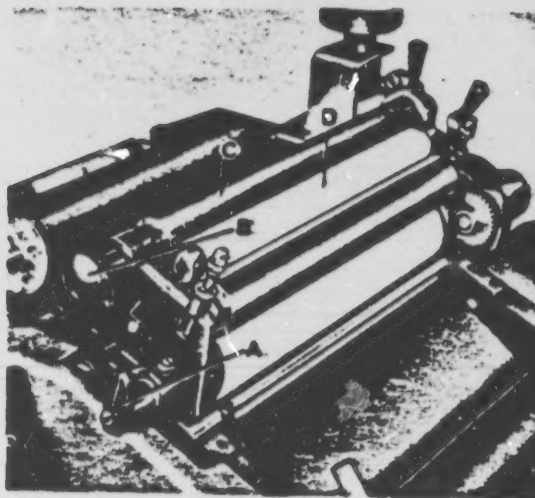
b. Blanket cylinder. The blanket cylinder, like the plate cylinder, has no bearers. This is the only cylinder on the "1250" that is not adjustable. The blanket is attached by means of two bars stationed parallel to the leading and tail edge of the cylinder. These bars have hooks and thumb screws which must be kept tight during printing to prevent double images and damage to the blanket.

c. Impression cylinder.

(1) Trip mechanism. As it is being forwarded, the sheet activates a smaller finger between the upper and lower feed rollers which puts the press on impression. This finger can be adjusted up or down for different thicknesses of stock. This adjustment is located on the operator side of the press to the right of the eccentric adjustment of the lower feed roller.

(2) Pressure adjustment. The adjustment for more or less pressure between the blanket and impression cylinders is

located on the operator side of the press just under the hand wheel. The lock nut is loosened and the adjusting knob is turned clockwise for less pressure and counter-clockwise for more pressure (figure 5).



THE DAMPENING ASSEMBLY

FIGURE 6

5. DAMPENING ASSEMBLY

a. Water pan. The water pan on the "1250" holds the solution for dampening the plate and is as long as the cylinders. An automatic water level bottle is placed in an upright position in a bracket and keeps the water at a constant operating level. The fountain roller is knurled to hold more water (figure 6).

b. Ductor roller. The ductor roller is self-parallelizing and can be turned off and on by engaging a small handle on the far side of the press (figure 6D).

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c. Oscillating roller. The oscillating roller rides on the form roller and has only a spring pressure for more or less pressure to the form roller. It can be removed easily for cleaning.

d. Water form roller.

(1) Covering. The 1250 has only one water form roller. It is rubber cored and covered with a cloth molleton covering.

(2) Parallelling. Before operation, the water form roller must be parallellled to the plate. This is accomplished by loosening an allen screw on the operator side of the press near the operating handle for the form roller and then turning the handle up or down. Only one side of the roller will move to parallel the roller.

(3) Plate pressure. To obtain more or less pressure to the plate, an allen screw on the handle itself is loosened and then a screw in the end of the handle is turned up or down for more or less pressure. This is an eccentric type adjustment (figure 6A).

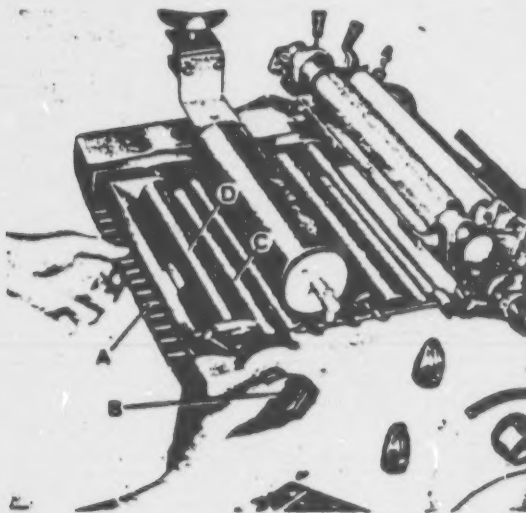


FIGURE 7

6. INKING ASSEMBLY

a. Ink fountain and keys. Fourteen adjusting screws control the flow of ink from the ink fountain in the same manner as a larger type offset press. The ink blade is not removable, but the whole ink fountain is removable for easy cleaning of the fountain and the fountain roller (figure 7A).

b. Ductor roller. The ductor roller is self paralleling and has an adjustment to the fountain only for more or less pressure (figure 7C).

c. Oscillating rollers. The inking assembly has two oscillating rollers. One is non-removable; the other that rides on top is removable for easy cleaning and to gain access to the rest of the rollers.

d. Rider rollers. The press is equipped with three rider rollers which can be interchanged with each other. These rollers ride directly beneath the top oscillating roller.

e. Form rollers.

(1) Description. The press has two form rollers which can be interchanged with each other. They are constructed of soft rubber and have an operating knob the same as the dampening form roller.

(2) Paralleling. Before operation, the form rollers must be paralleled to the oscillating roller and the plate. This adjustment is located on the far side of the press. To adjust, a screw is loosened and a knurled knob turned up or down to parallel the roller. If there is any end play in the roller, it can be eliminated by loosening the same screw and then pushing in on the knurled knob.

(3) Pressure. To adjust the pressure of the form roller to the plate, an allen screw is loosened in the operating handle and a screw turned in the end of the handle up for more pressure or down for less pressure to the plate.

7. PREVENTIVE MAINTENANCE

Just like any other piece of mechanical equipment, keep the "1250" properly lubricated. Each day before operation, apply a small amount of oil to all moving parts and regularly marked oil holes. Because of its small size, it is important that the press not be over oiled. Grease all cylinder shafts once each week. At the end of each day, wipe all excess oil up and wipe all exposed surfaces of the press clean. If all preventive measures

are taken very carefully, and the press is inspected periodically for excessive wear and tear, it will give many years of trouble-free service.

8. SAFETY

Safety is just as important on the "1250" as on any larger offset press. Because of its small size, most operators think that this small press is not dangerous. This, of course, is not true. During operation, keep all guards in place and keep the working area neat and orderly to prevent accidents and injury to the pressman or the press.

9. CRITIQUE

a. Re-pose key questions.

Q. What are the stock and image sizes?

A. The minimum size is 3 x 5 inches.

The maximum size is 11 x 14 inches.

The maximum image size is 9½ x 13 inches.

Q. What is the function of the press controls?

A. The press controls starts and stops the press and adjusts the speed of the press.

Q. How does the feeder operate?

A. The feeder has a capacity of 5000 sheets and is started by the main press switch. The height of the pile is controlled by a governor. A Solenoid 2 sheet choke prevents 2 sheets from going into the press. The air blast nozzles assists in separating the sheets and the pull-in wheels move the paper onto the conveyor board. The paper moves along the conveyor board and is properly positioned by the stop fingers and side guide. The upper and lower feed rollers move the paper into the cylinder grippers. After printing the ejector wheels moves the paper into the delivery.

Q. What are the components of the cylinder assembly?

A. The cylinder assembly consists of the Plate cylinder, the Blanket cylinder, and the Impression cylinder with the necessary trip and adjustment mechanisms.

Q. What are the components of the dampening assembly?

A. The components of the dampening assembly are the water pan, ductor roller, oscillating roller and one form roller.

Q. What are the components of the inking assembly?

A. The inking assembly consists of the ink fountain and keys, fountain roller, ductor roller, two oscillating rollers, three rider rollers, and two ink form rollers.

Q. How is preventive maintenance performed?

A. By properly lubricating press daily, greasing press weekly, and cleaning up excess oil and all exposed surfaces of press at the end of each day.

Q. What are the necessary safety precautions?

A. Keep all guards in place and keep the work area neat and orderly to prevent accidents during operation.

b. Clarify any misconceptions.

SUMMARY

In today's lesson some of the operating principles and capabilities of the "1250" Multilith press were discussed. The operation and adjustment of the feeder, delivery, cylinder, dampening and inking assemblies were covered. Remember that all adjustments must be made accurately so the press will function properly. Also, remember to keep the press in good operating order by proper lubrication and preventive maintenance.

Safe operation means: Keep all guards in place during operation. It is not so important to remember each step in press operation, but rather to remember in general its operating capabilities and characteristics. Knowledge of Multilith 1250 operation may help you later either in your military or civilian occupation.

STUDENT ADVANCE SHEET

SUBJECT: Offset Press Operation

LESSON: Multilith Press, Model 1250

OBJECTIVE(S): To provide each student with a working knowledge of the operation, capabilities, preventive maintenance and safety precautions pertaining to the Multilith Press, Model 1250.

STUDY REFERENCES: None.

SUPPLEMENTARY INFORMATION: Instruction in the area of the Multilith Press, Model 1250, will be accomplished in the following sequence:

1. Demonstration (one hour) will include:

- a. Stock and image sizes
- b. Electrical control and speed
- c. Feeder operation
- d. Cylinder assembly
- e. Dampening assembly
- f. Inking assembly
- g. Preventive maintenance
- h. Safety

2. Student practical exercise (seven hours). The objective of this exercise is to give the student a working knowledge in the operation and care of the Multilith Press, Model 1250.

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STUDENT PRACTICAL EXERCISE

SUBJECT: Offset Press Operation

LESSON: Multilith Press, Model 1250

OBJECTIVE(S): To raise the student's level of knowledge of the operation, capabilities, preventive maintenance and safety precautions pertaining to the Multilith Press, Model 1250.

NOTE TO INSTRUCTOR:

1. Divide class into groups of not to exceed four students each.
2. This practical exercise will be a round-robin-type held in conjunction with the Harris LUD Press, The Cleveland Folder, and the paper-stitching machine.
3. Distribute APPENDIX 1 to ANNEX C (Student PE Advance Sheet) and discuss with class as necessary.

MATERIALS AND SUPPLIES REQUIRED:

- | | |
|-----------------|-----------------------------|
| 1. Ink | $\frac{1}{4}$ lb. per group |
| 2. Paper | 100 sheets per students |
| 3. Press plates | 1 per student |
| 4. Tools | 1 set per press |

EQUIPMENT:

Multilith Press, Model 1250

FACILITIES:

1. Classroom: None
2. Training Area Facilities: Pressroom PE Area.

TRANSPORTATION REQUIREMENTS: None

ADDITIONAL PERSONNEL:

One assistant instructor.

STUDENT REQUIREMENTS:

1. Students will perform all necessary before operation

ANNEX C
T.440-122 (2-69)

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procedures. They will make all necessary adjustments before starting the press, load the feeder, mount the plate and blanket, and begin the run.

2. Students will complete a total run of 100 sheets on one side. With time permitting, students will then re-run the 100 sheets on the reverse side, using another pressplate.

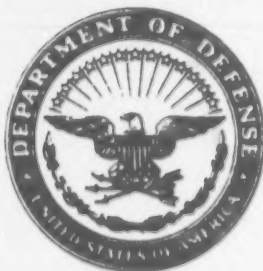
3. Each student will be rotated to gain the maximum experience in the time allotted.

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LESSON PLAN

BINDERY AND PRACTICE PRINTING II
740-303-B-040-010

OFFSET PRINTING



February 1975

DEFENSE MAPPING SCHOOL — FORT BELVOIR, VIRGINIA

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740-303-B-040-010

ORIENTATION SHEET

OFFSET PRINTING COURSE

SEGMENTSBLOCKSLESSONS

Press
Fundamentals
(104 Hours)

OFFSET PRESS
OPERATING PROCEDURES
(172 Hours)

Make-ready and Operational
Procedures (37 Hours)

Three Color Map Exercise
(48 Hours)

Five Color Map Exercise
(64 Hours)

MISCELLANEOUS PRINTING
(23 Hours)

BINDERY AND
PRACTICE PRINTING
II (23 Hours)

LESSON REQUIREMENTS SHEET

COURSE: Offset Printing Course

LESSON: Bindery and Practice Printing II

OBJECTIVE: Provided with an offset press (LIG or ATF-DP), press tools and supplies, appropriate manuals the student will operate and develop his printing skills on the printing machines he did not operate during the previous instruction. The student will also receive a demonstration on the paper stitcher and folder to acquire a knowledge of bindery equipment. Operation and training will be in accordance with appropriate publications.

TIME: 23 Hours: 19 PE, 4

TRAINING AIDS AND DEVICES:

1. Audio-Visual Aids or Devices: None
2. DA Training Aids: None
3. Service Training Aids: None

MATERIALS AND SUPPLIES:

- | | |
|---------------------------|----------------------|
| 1. Map stock | 500 sheets per press |
| 2. Ink | As required |
| 3. Rags | As required |
| 4. Oil | As required |
| 5. Press plates | 1 per press |
| 6. Stitching machine wire | 1 roll per class |

EQUIPMENT: None

TRAINING AREA:

Indoor: Practical exercise area equipped with one offset press and workbench with tool set for each group of designated students, paper folder (Cleveland Folder) and paper stitcher (National Wire).

Outdoor: None

TRANSPORTATION: None

ADDITIONAL PERSONNEL AND TROOPS:

1. Assistant Instructors:

- a. Demonstration: One instructor per designated group.
- b. Practical Exercise: Six assistant instructors.

TEXT REFERENCES:

- 1. Instructor References: TM 5-245 (7-70), Offset Photolithography and Map Reproduction; Chap 9, Sect III, para 9-8 thru 9-14; Sect IV, para 9-15 thru 9-18, Chap 8, paragraphs 8-1 thru 8-30.

Harris Operators Manual; Section III thru XIV.

- 2. Student References: TM 5-245 (7-70), Offset Photolithography and Map Reproduction; Chap 9, Sect III, para 9-8 thru 9-14; Sect IV, para 9-15 thru 9-18; Chap 8, paragraphs 8-1 thru 8-30.

Harris Operators Manual; Section III thru XIV.

- 3. Average Student Homework Time: 2 Hours

LESSON OUTLINE

LESSON: Bindery and Practice Printing II

TIME	SUBJECT MATTER OUTLINE	INSTRUCTIONAL TACTICS
	<u>INTRODUCTION</u>	
00:00	In your last lesson PRINT A FIVE COLOR MAP AND PHOTOMAP you performed the tasks a pressman must do in order to print a quality five-color map and photomap. In this lesson you will see a demonstration on two of the machines that you could operate once assigned to a unit, the paper folder and stitcher. These two machines are frequently used in the final processing of a job you may have printed. During this lesson you will be cross-trained on the offset press which you did not operate during the previous lessons. This training will familiarize you with the controls and devices of a different machine. Remember that the machine may be different, but the theory of operation is the same for most offset presses. During this practical exercise all safety precautions will be in effect and all maintenance functions will be performed daily prior to operation.	Students are to remain in designated groups for demonstration on folder and stitcher. Explain students on DP press will move to LKG and LKG students move to DP press as assigned by instructor. Explain importance of safety regulations. Explain instruction is given simultaneously on folder, stitcher and press. Upon completion of the demonstration on the folder and stitcher the students will all perform FE on assigned press to complete cross-training.
	<u>DEVELOPMENT</u>	
00:10	1. PAPER FOLDER - Controls - Feeder board - Folding procedure - Delivery stocker	Point out and explain all components. Demonstrate all necessary adjustments. Ask questions to check student understanding.

TIME	SUBJECT MATTER OUTLINE	INSTRUCTIONAL TACTICS
00:30	2. PAPER STITCHER a. Capabilities b. Threading c. Types of stitching wire (1) Round (2) Flat d. Stitches used in binding (1) Saddle stitch (2) Side stitch e. Setting stitch thickness	Point out and explain all components. Demonstrate all necessary adjustments. Explain types of wire used. Demonstrate saddle and side stitch. Ask questions to check student understanding.
00:50	3. PRACTICE PRINTING (HARRIS LXG or ATF-DP) a. Purpose b. Techniques c. Safety (QUESTIONS AND COMMENTS PERIOD)	Explain purpose of cross training. Stress safety throughout lesson. Ask questions to check student understanding.
		BREAK AT INSTRUCTOR'S DISCRETION
01:00	<u>APPLICATION</u>	Student understanding was checked throughout the lesson by instructor. (See instructional tactics). Students are to perform practical exercise.
		BREAK AT INSTRUCTOR'S DISCRETION
22:50	<u>SUMMARY</u> In the last twenty three hours of instruction you have had a demonstration	

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TIME	SUBJECT MATTER OUTLINE	INSTRUCTIONAL TACTICS
	on two pieces of bindery equipment and had a chance to operate the press other than your regularly assigned press you operated during the previous weeks of instruction. The demonstration on the bindery equipment will help you if you go to a unit which has stitchers or folders. Sometimes a pressman is called upon to perform bindery functions. This is also the last lesson you will receive during your stay at the Defense Mapping School. If at any time you feel we can be of help to you; please notify us by mail and we will help you to solve any problems that you as a pressman may have.	

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INSTRUCTOR NOTES

1. PAPER FOLDER

- a. Historical data: None
- b. Anecdotes: None
- c. Content: The student will be shown the component parts of the folder. The instructor will demonstrate how the folder operates, to include controls, loading the feeder board, and how the paper is folded and show the students the final folded sheet.
- d. Tactics: None

2. PAPER STITCHER

- a. Historical data: None
- b. Anecdotes: None
- c. Content: The instructor will demonstrate the operation of the paper stitcher and explain its capabilities. He will make a saddle stitch and side stitch and explain the types of wire used in the stitcher, and how the machine is adjusted for various thicknesses of stock.
- d. Tactics: None

3. PRACTICE PRINTING

- a. Historical data: None
- b. Anecdotes: None
- c. Content: The instructor will assign students to the press which he did not operate during the previous lessons. The student will perform a practice printing exercise to get familiar with the other type of press.
- d. Tactics: None

4. EXPLANATION

This lesson was last systems engineered in May 1969.

STUDENT ADVANCE SHEET

LESSON: Bindery and Practice Printing II

OBJECTIVE: Provided with an offset press (LIG or ATF-DP), press tools and supplies, appropriate manuals, the student will operate and develop his skills on the printing machines he did not operate during the previous instruction. The student will also receive a demonstration on the paper stitcher and folder to acquire a knowledge of bindery equipment. Training and operation will be in accordance with appropriate manuals.

STUDENT REFERENCES: The following reading assignments are to be accomplished prior to the lesson

TM 5-245 (7-70), Offset Photolithography and Map Reproduction. Chap 8, para 8-1 thru 8-30 (scan); Chap 9, Sect III, para 9-8 thru 9-14; Sect IV, para 9-15 thru 9-18 (read).

Harris Operators Manual; Sections III thru XIV (scan).

SUPPLEMENTARY INFORMATION: The instruction in Bindery and Practice Printing II will be accomplished in the following sequence:

1. Paper Folder

- a. Explanation of operation of controls.
- b. Demonstration on loading feeder.
- c. Demonstration on folding procedures.
- d. Demonstration on delivery stocker.

2. Stitcher

- a. Explanation of stitching procedures.
- b. Demonstration on operation of stitcher.
- c. Explanation of types of wire.
- d. Demonstration on adjustments to stitcher.

3. Practical Exercise (19 Hours) This exercise is designed to permit the student to apply the theory and principles presented during the previous lessons on the press which he did not operate, in order to familiarize the student with another type of press he may be required to operate once leaving DMS.

STUDENT PRACTICAL EXERCISE

LESSON: Bindery and Practice Printing II

OBJECTIVE: Provided with an offset press (LKG or ATF-DP), press tools and supplies, appropriate manuals, the student will develop his skills on the printing machines he did not operate during the previous instruction. This training and operation will be in accordance with appropriate manuals.

MATERIALS AND SUPPLIES REQUIRED:

- | | |
|-------------------------|----------------------|
| 1. Map stock | 500 sheets per press |
| 2. Ink | As required |
| 3. Rags | As required |
| 4. Lubricants for press | As required |
| 5. Press plates | 1 per press |

EQUIPMENT: None

FACILITIES: Pressroom equipped with one offset press and workbench with tool set for each group of designated students.

TRANSPORTATION REQUIREMENTS: None

ADDITIONAL PERSONNEL: One instructor per two presses.

STUDENT REQUIREMENTS:

1. Make a manual and visual safety check prior to operation.
2. Lubricate the press as per instruction.
3. Select and cut stock when necessary.
4. Prepare feeder and delivery assembly.
5. Prepare cylinder assembly.
6. Prepare dampening assembly.
7. Prepare inking assembly.
8. Insure that safety procedures are observed at all times.
9. Test run sheets through press to check if all settings were properly made, and complete job assignment.

SOURCE MATERIALS

LESSON: Bindery and Practice Printing II

1. Paper Folder - TM 5-245

- a. Paragraph 9-8
- b. Paragraph 9-9
- c. Paragraph 9-10, a, 11
- d. Paragraph 9-12

2. Paper Stitcher - TM 5-245

- a. Paragraphs 9-15, a, b, c, d
- b. Paragraph 9-16, a
- c. Paragraph 9-15, c
 - (1) Paragraph 9-15, c
 - (2) Paragraph 9-15, c
- d. Paragraph 9-16
 - (1) Paragraph 9-16, d, (1)
 - (2) Paragraph 9-16, d, (2)
- e. Paragraphs 9-16, 6, (1), (a)

3. Practice Printing

- a. TM 5-245, Chap 8, Sections VI, VIII, IX, X; Harris Operators Manual, Section XIV, para 118-119
- b. TM 5-245, Chap 8, Sections VI, VIII, IX, X; Harris Operators Manual, Section XIV, para 118-119
- c. TM 5-245, Chap 8, Sections VI, VIII, IX, X; Harris Operators Manual, Section XIV, para 118-119

LESSON REFERENCE FILE
PAPER FOLDING MACHINE

T.440-123



JANUARY 1969

US ARMY ENGINEER SCHOOL - FORT BELVOIR, VIRGINIA

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SECTION I	- Lesson Support Requirements
SECTION II	- Lesson Outline
SECTION III	- Source Material
ANNEX A	- None
ANNEX B	- None
ANNEX C	- None

This publication supersedes LRF, T.012-23 (6-62);
BINDERY EQUIPMENT FUNDAMENTALS.

SECTION I
LESSON SUPPORT REQUIREMENTS

SUBJECT: Bindery Equipment Fundamentals

LESSON: Paper Folding Machine

TRAINING AIDS AND DEVICES:

1. D. A. Training Aids: None
2. Service Training Aids: None

MATERIALS AND SUPPLIES:

1500 used sheets of map stock

EQUIPMENT:

1. Cleveland Folding Machine MS (25 X 38 inches)
2. Set of tools (provided with the machine)

PACENOTES:

1. Classroom: None
2. Training Area Facilities: Offset press PE area

TRANSPORTATION: None

ADDITIONAL PERSONNEL AND DEMONSTRATION TROOPS:

1. Assistant Instructor(s): One
2. Demonstration Troops: None

TEXT REFERENCES:

1. Required References:
Manufacturer's Manual - Cleveland Folding Machine MS
2. Excerpted References: None

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SECTION II
LESSON OUTLINE

SUBJECT: Bindery Equipment Fundamentals

LESSON: Paper Folding Machine

TIME PERIOD (TOTAL): 1 Hour

TYPE OF LESSON: Demonstration

OBJECTIVE(S): To provide the student with a general knowledge of folder operation and maintenance, types of folds, folder capabilities, and paper characteristics.

SUPPORT REQUIREMENTS: Refer to SECTION I

STUDENT REFERENCES: Refer to Schedule of Instruction

INTRODUCTION

00:00

The instruction of this course up to this point is designed to give you a general knowledge of offset press operation. The object of the instruction during the next period is to give you a general idea of some of the bindery equipment which supports the printing operation. Today, you will see a demonstration of the Cleveland Folding Machine, Model MS, and hear an explanation of how it works. Its purpose is to fold maps, forms, and brochures. Many other types of printing jobs can be folded on it. Knowledge of folding, when properly applied, can save much time and material in the overall printing of some projects.

It is not expected that you will know how to fold after seeing this demonstration, but if you learn the basic idea behind the operation, you will be on your way to satisfactory operation when you get a little practice.

During the demonstration look for the answers to the following questions:

1. What weight stock can be run efficiently on this folder?
2. What is the purpose of the caliper?
3. A signature of how many pages is the folder capable of folding?

DEVELOPMENT

00:02 1. CONTROLS

- a. Operating controls (Electrical)
- b. Operating controls (Manual)

00:04 2. VARIABLE SPEED CONTROL

00:06 3. UPPER LOADING BOARD

- a. Positioning of stock
- b. Moving the stock to the lower feeder board

00:08 4. STOCK HOLD DOWN FINGERS

00:10 5. LOWER FEEDER BOARD

- a. Description
- b. Amount of stock to be fed
- c. Back stop rollers
- d. Airwheel
- e. Air blast nozzle
- f. Governor roll
- g. Caliper
- h. Feeder drive wheels
- i. Sheet gap governor
- j. Side guide
- k. Miscellaneous
 - 1. Paper characteristics
 - m. Folder capabilities

00:20 6. FEED TABLE

00:25 7. THE FOLDING PROCEDURE

- a. Step 1
- b. Step 2
- c. Step 3
- d. Step 4
- e. Step 5
- f. Step 6

00:30 8. DELIVERY AND STACKERS

- a. Slitter shafts
- b. Stackers
- c. Delivery belt
- d. Cross carrier

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- 00:35 9. THE POWER TRAIN
- 00:40 10. LUBRICATION AND MAINTENANCE
- 00:43 11. CRITIQUE

- a. Repose key questions
- b. Clarify any misconceptions

(QUESTIONS AND COMMENTS PERIOD)

SUMMARY

- 00:47 1. Controls
- 2. Variable Speed Control
- 3. Upper Loading Board
- 4. Stock Hold Down Fingers
- 5. Lower Feeder Board
- 6. Feed Table
- 7. The Folding Procedure
- 8. Delivery and Stackers
- 9. The Power Transfer
- 10. Lubrication and Maintenance
- 11. Tie-in to the Next Class on the Paper Stitching Machine

00:05 BREAK

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SECTION III
SOURCE MATERIAL
PAPER FOLDING MACHINE

INTRODUCTION

The instruction of this course up to this point is designed to give you a general knowledge of offset press operation. The object of the instruction during the next period is to give you a general idea of some of the bindery equipment which supports the printing operation. Today, you will see a demonstration of the Cleveland Folding Machine, Model MS, and hear an explanation of how it works. Its purpose is to fold maps, forms, and brochures. Many other types of printing jobs can be folded on it. Knowledge of folding, when properly applied, can save much time and material in the overall printing of some projects.

It is not expected that you will know how to fold after seeing this demonstration, but if you learn the basic idea behind the operation, you will be on your way to satisfactory operation when you get a little practice.

DEVELOPMENT

1. CONTROLS

a. Operating controls (Electrical). There are three electrical control boxes. One is located on the operator side of the folder and toward the feeder end of the machine. This is one of the boxes for the overall operation of the folder. Another box for the overall operation is located on the frame between the parallel section of folds and the 8-page section of the folder. In both of the above mentioned boxes there are two buttons - a Start and a Stop button.

The third box is located on the frame on the operator side of the folder. This box contains the controls for the blower and vacuum controls. It has two buttons - a Start and a Stop button.

When working on the electrical system, snap the main power switch to cut the power off the entire folder.

b. Operating controls (Manual). The feeder control rod is located at the end of the parallel section of the folder. It allows the operator to stop the feeding of sheets while at the end of the folder checking folds.

When the folder is running, pull the rod out to start the paper moving from the lower feed board to the feeder table. To stop the feeding of stock, push the rod in. The feeder control rod

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is also hooked in conjunction with the two sheet caliper and they both work by the same principle.

When the rod is pushed, it moves a brake into place beside the flywheel which is connected to the airwheel. This stops both the rotation of the flywheel and the rotation of the airwheel. When the airwheel is not rotating, the paper is not fed onto the feeder table.

2. VARIABLE SPEED CONTROL

The variable speed control is located on the far side of the folder. It is a crank that either raises or lowers the motor to change the speed of the folder. When the motor is lowered, it increases the speed of the folder; when the motor is raised, the speed of the folder is decreased. A pulley with large flanges controls the position where the gears mesh. The amount of pull on the pulley determines the vertical and horizontal position and gear ratio which controls folder speed.

3. UPPER LOADING BOARD

a. Positioning of stock. Place the stock on the feed board face down. Then fan the paper out so that one sheet overlaps all but 1/16" of the sheet below it. When fanning stock, keep the paper jogged neatly to the side guide. This will insure that the paper is fed into the feeder at exactly the same place every time. When loading the upper feeder board, do not load the stock over the top edge of the side guide. This is a double feeder board model which allows constant loading to take place.

b. Moving the stock to the lower feeder board. Tapes on the upper loading board convey the stock to the lower feeder board so continuous loading can take place. Stock is moved either by a manual handle on the operator side of the folder or by letting the automatic governor roll move the stock to the airwheel.

4. STOCK HOLD DOWN FINGERS

The stock hold down fingers are at the feeder end of the folder and are used when transferring the stock from the upper loading board to the lower feeding board.

There are ten hold down fingers and they are positioned to the stock size being run. Their main purpose is to transfer the stock from the upper loading board to the lower feeding board without letting the stock drop to the floor. They also aid in fanning out the stock so an even layer of stock is kept at the airwheel at all times. This increases feeder efficiency.

5. LOWER FEEDER BOARD

a. Description. The lower feeder board also has a set of conveyor tapes to forward stock to the airwheel. The lower feeder board side guide feeds the stock under the airwheel and aligns it on the feeder table.

b. Amount of stock to be fed. When setting the feeder, turn the hand crank to bring the stock so that the leading edge of the stock is even with the wind brake plate. Start the feeder, Arrange the leading edge of the stock to stick over the edge of the wind brake plate by $\frac{1}{4}$ inch. Adjust by moving the stock with the bank feed adjustment screw that adjusts the guides on either side of the airwheel.

c. Back stop rollers. Set the back stop rollers so they are resting on the top sheet about $\frac{1}{4}$ inch from the tail edge of the sheet. Do this so the air blast will not slide the sheet from the airwheel.

d. Airwheel. The airwheel rotates continually and picks up the top sheet and forwards it to the feed table. The speed is controlled by a starwheel on the operator side of the folder. The amount of suction is regulated by the lever marked S on the side by the frame near the over-all electrical controls. position the wheel to the left of center on the stock to give the stock a slight angle so that it will stay in tight against the side guide.

e. Air blast nozzle. The air blast nozzle is in front of the airwheel and the caliper. It is below the feeder table, and can be adjusted to various size stocks and weights of paper. The nozzle is a slotted tube with a shield; it can be used to regulate the amount of air required. Never set the nozzle directly below the suction of the airwheel as this defeats the purpose of the suction and just blows the air in a circle. When properly set, the air blast floats the first three or four sheets of stock. To control the amount of air, use the lever marked with an A on the same casting with the suction control lever.

f. Governor roll. The governor roll is a wheel that controls the amount of stock that is to be kept under the airwheel at all times. Set it as near to the airwheel as possible. It is equipped with two different weights. There is a light weight for normal stock and a heavier one for heavy stock. The weights balance the caliper roll.

g. Caliper. The caliper insures that only one sheet of stock is fed into the folding rollers at a time. It is set to trip the feeder automatically if more than one thickness of stock enters.

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The tripping of the feeder is done by the jamming of a wedge-shaped brake against the flywheel.

h. Feeder drive wheels. The feeder drive wheels insure that the paper gets off to a quick accurate start. They are on the same bar with the caliper. Set them as close to the caliper as practical for the size stock that is to be run and set with enough tension so that the paper will pull a slight bit toward the side guide. Set the feeder drive wheel closest to the operator side with slightly less tension than the other wheel. The feeder drive wheels are spring loaded so a bad sheet can be removed easily.

i. Sheet gap governor. The governor is on the operator side of the folder. It is adjusted in conjunction with the air-wheel (para 5d) by the starwheel on the operator side. It is used to decrease or increase the gap between sheets fed into the folder. This regulates the speed with which stock is run.

j. Side guide. The side guide consists of either glass marbles for light stock or steel marbles for heavy stock set in a steel retaining bracket. They help drive the paper to the folding roller by adding weight to the stock and increasing the friction between the stock and the feeder table. There is a micrometer adjustment on the side for accurate register.

k. Miscellaneous. The folder is optionally equipped with a pasting attachment. This is used to paste six and eight page leaflets together to avoid another binding step. Alignment is made easier with the shift side guide which is usually part of the attachment.

l. Paper characteristics. Stock from the weight of nine pound onion skin to 140 pound index can be run efficiently on this folder.

m. Folder capabilities. This folder is capable of folding a 32 page signature and can run stock up to 25 X 38 inches and as small as 5 X 7 inches. It will fold any size paper in any one of three folds; parallel booklet, right angle imposition, and right angle broadside.

6. FEED TABLE

The feed table is a set of diagonal rollers that transfer the paper from the lower feeder board to the folding sections. The rollers are friction driven so they will slip if necessary. The diagonal running position keeps the stock against the side guide and helps register.

7. THE FOLDING PROCEDURE

The following is a step-by-step procedure describing how a sheet of paper goes through standard folding sections of the Cleveland Model MS Folder.

a. Step 1. The sheet is advanced from the feed table or cross carrier, and enters between the Number 1 and 2 rollers of the folding section. If, according to composition requirements, the first fold is to be made in the Number 1 fold plate, the Number 1 deflector will have been raised by the operator during make ready, thereby opening the Number 1 fold plate. The Number 1 and 2 rollers drive the sheet up into the open Number 1 fold page until.....
(See Figure 1)

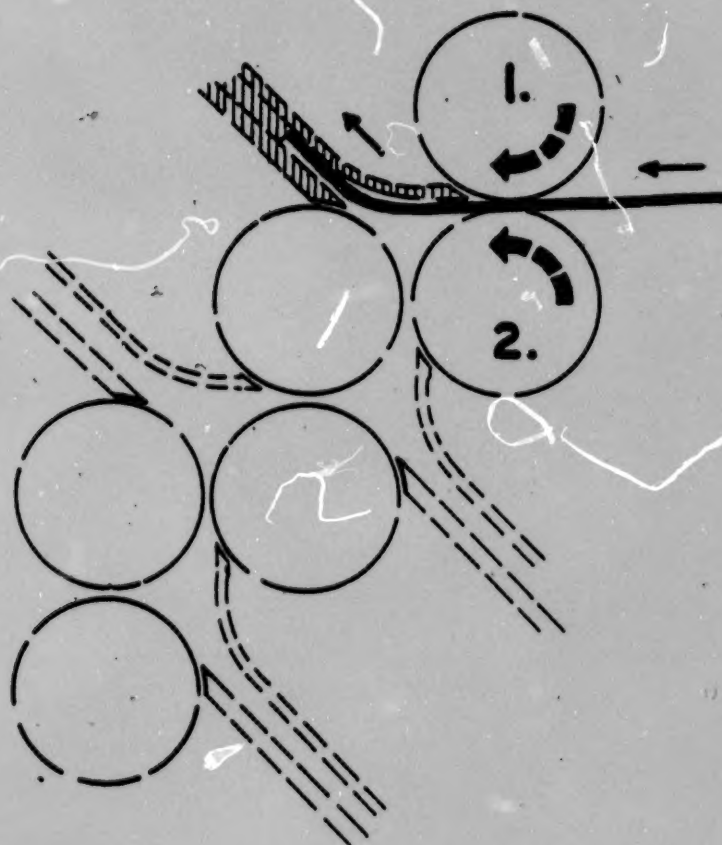


FIGURE 1. FOLDING PROCEDURE STEP 1

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b. step 2. The leading edge of the sheet strikes the fold plate gauge, which has been preset by the operator to fold size requirements. The sheet's forward movement, having been stopped by the fold plate gauge, causes the sheet to buckle and be drawn in between the Number 2 and 3 rollers which fold the sheet at the required first fold line. (In a right angle section the sheet, having been previously scored or perforated, will buckle and automatically fold on the score or perforation line.) It will be noted, in steps 1 and 2, that roller Number 1 acts only as a drive roller, while Number 2 roller which is a stationary (not tension) adjustable roller, operates with Number 1 as a driving roller and then with Number 3 as a fold roller for plate Number 1 (See Figure 2).

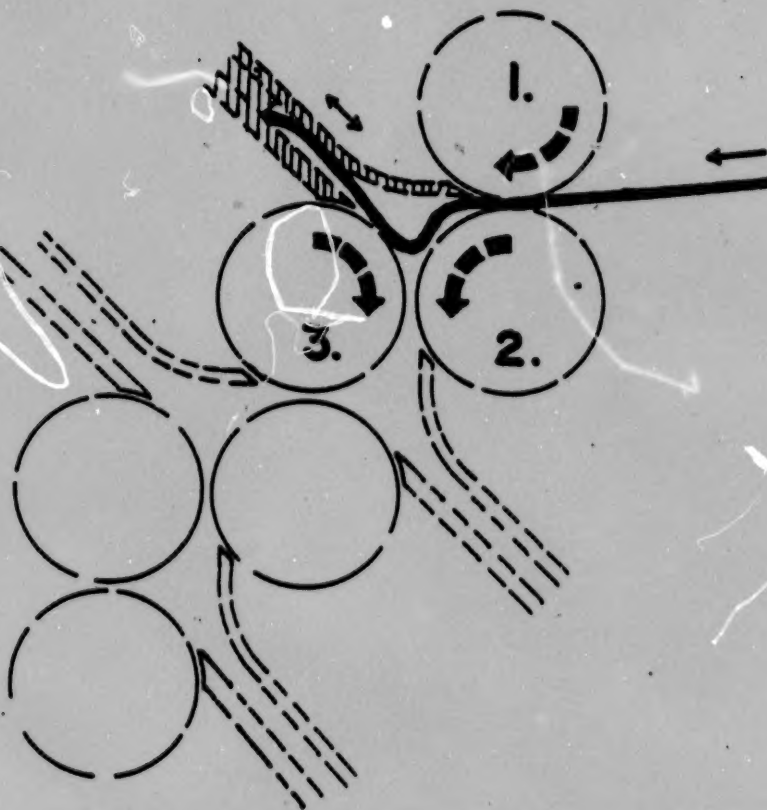


FIGURE 2. FOLDING PROCEDURE STEP 2

c. Step 3. If according to composition requirements a second fold is to be made using fold plate Number 2, the once folded sheet is driven by the Number 2 and 3 rollers into the Number 2 fold plate, the deflector having been raised until.... (See Figure 3)

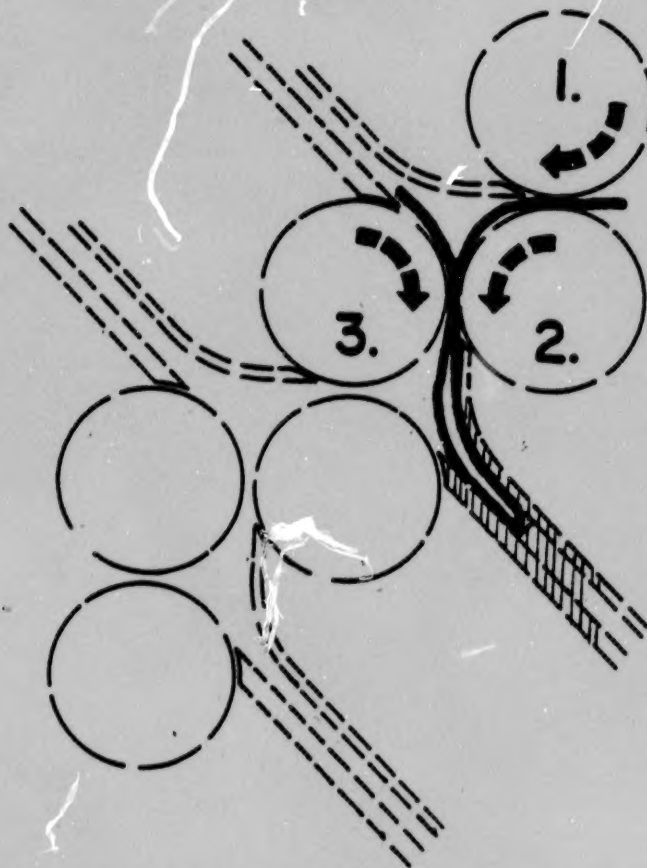


FIGURE 3. FOLDING PROCEDURE STEP 3.

d. Step 4. The folded edge of the sheet strikes the preset Number 2 fold plate gauge. The sheet buckles and is drawn between the Number 3 and 4 rollers which fold the sheet at the required second fold line. Note in steps 3 and 4 that rollers 2 and 3, after serving as drive rollers to advance the sheet into fold plate Number 2, the Number 3 roller then operates the Number 4 as a folding roller for fold plate Number 2.

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If a third fold is to be made in a section equipped with three fold plates, the twice folded sheet will then be driven by the Number 3 and 4 rollers into the third fold plate, its deflector having been raised. As in the previous folding operation, the sheets strike the preset gauge. This buckles the sheet and draws it between the Number 4 and 5 rollers which fold the sheet at the required third fold line. If the third fold was made in a section in which provision has been made for adding a fourth fold plate, the sheet will then be advanced by rollers 4 and 5 until it strikes a removable deflecting plate (not shown in Figure 4) which directs the sheet in between rollers 5 and 6; the deflecting plate is easily removed when the fourth fold plate is added. Rollers 5 and 6 then advance the sheet to the slitter shafts. (See Figure 4)

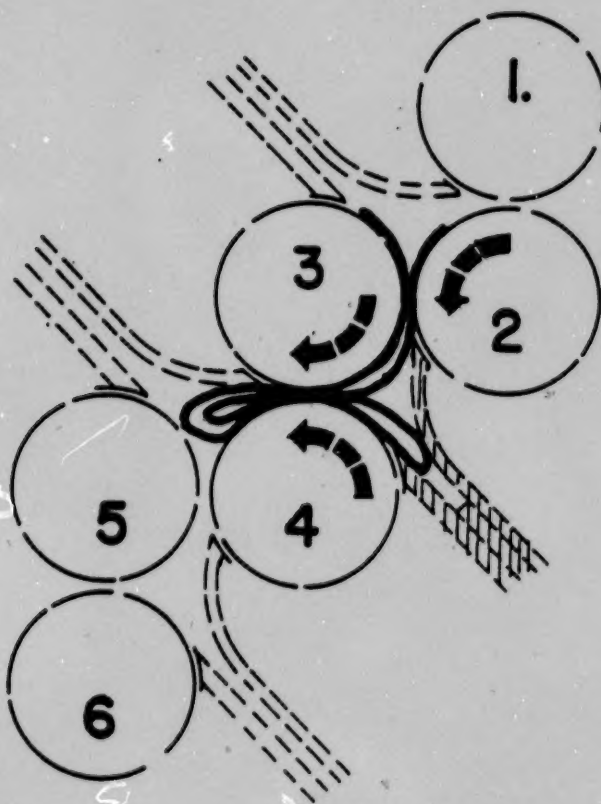


FIGURE 4. FOLDING PROCEDURE STEP 4.

e. Step 5. In a four fold plate section, the imposition might call for the third fold to be made in the fourth fold plate, in this case, the operator lowers the Number 3 deflector which allows the sheet to enter the fourth fold plate. The twice folded sheet then is advanced by rollers 3 and 4 until it strikes the Number 3 deflector which direct the sheet past the Number 3 deflector which direct the sheet past the Number 3 fold plate and between the 4 and 5 rollers. The Number 4 and 5 rollers then drive the sheet into the Number 4 fold plate where... (See Figure 5)

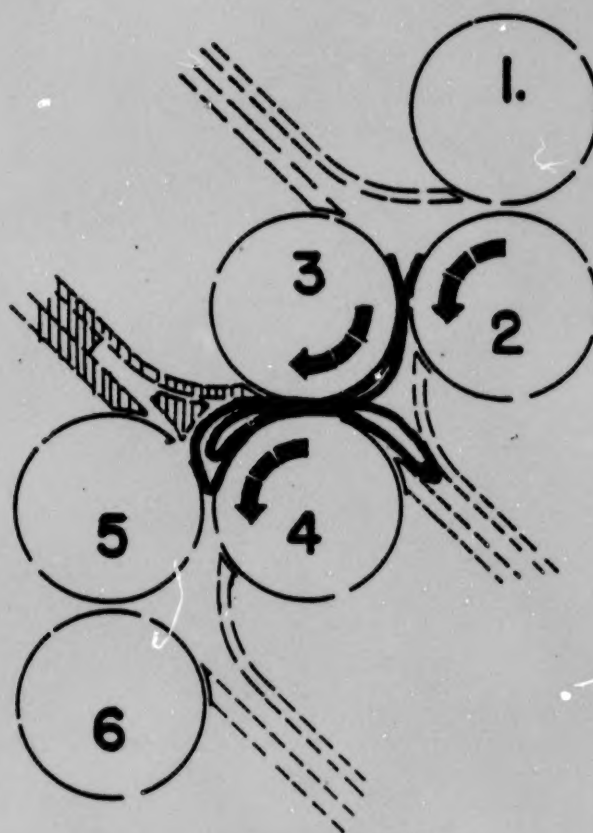


FIGURE 5. FOLDING PROCEDURE STEP 5

f. Step 6. It strikes the fold plate gauge, buckles, and is drawn into and folded by rollers 5 and 6. The sheet is then advanced by rollers 5 and 6 to the slitter shafts where the signature is now scored, perforated, slit, or trimmed, to meet job requirements....(See Figure 6)

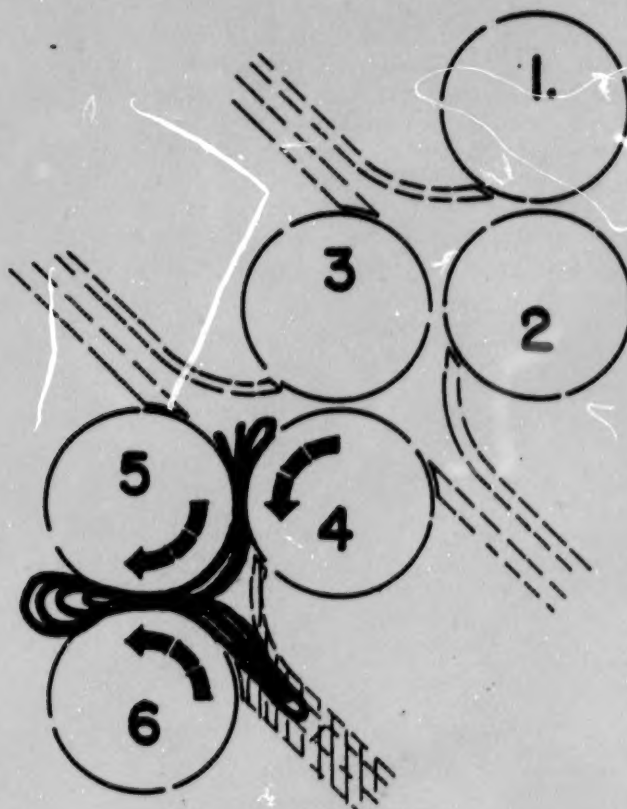


FIGURE 6. FOLDING PROCEDURE STEP 6.

8. DELIVERY AND STACKERS

a. Slitter shafts. The slitter shafts are two shafts mounted on the frame at the end of a folding section. On these shafts can be mounted rubber rollers or perforators to score the sheet as it passes between them; slitters are a scoring device. The purpose of scoring a sheet is to make it fold easier. A trimmer can be mounted on a slitter shaft. A trimmer cuts off material sticking out where it is not wanted.

b. Stackers. When the signature comes out of the folding section it goes between the slitter shafts. It is then dropped on a belt; to keep it in place on the belt, there are stacker rollers. They keep the folded edge of the sheet in contact with the belt so the job will flow smoothly onto the delivery tray. If stacker wheels are not used, the job piles up at the end of the folding section and jams the folder. If the job has quite a bit of spring in it, the best stacker is a spring deflector. The spring

deflector has a steel foot that rides on the work and is adjustable for different fold thicknesses. Both of the stackers mount on the cross bar on the delivery belt assembly.

c. Delivery belt. The delivery belt is a removable assembly used at the end of the parallel section of folds if only four folds are desired, or it is replaceable with a cross carrier mounted at the end of the eight page section. The belt on the delivery is spring loaded and the tension is adjusted to either increase or decrease the speed of the delivery belt.

d. Cross carrier. The cross carrier is mounted at the end of the parallel section of fold if cross folds are required. It is a miniature feeder board. It has a series of diagonal rollers with a side guide to insure the straight line feeding of paper into the next set of folds.

9. THE POWER TRAIN

Gears control the power transfer from one section of folds to another. To hook into another section of folds - other than parallel section which is on a direct drive - use a screwdriver to engage the gear on the shaft while the folder is not running. The gears are on the operators side of the folder between the parallel section of folds and the 8-page section of folds, and likewise between the 8 and 16, and the 16 and 32-page sections.

10. LUBRICATION AND MAINTENANCE

For long life and better running, schedule lubrication of the folder using the Lubrication Order as a guide. On the folder there are many grease fittings, oil cups, ball oilers, and oil holes. Use S.A.E. #40 weight oil and medium cup grease.

11. CRITIQUE

a. Repose key questions.

Q. What weight stock can be run efficiently on this folder?

A. Stock from the weight of nine pound onion skin to 140 pound index stock can be run efficiently on this folder.

Q. What is the purpose of the caliper?

A. To insure that only one sheet of stock is fed into the folding rollers at a time.

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Q. 1. signature of how many pages is the folder capable of folding?

A. This folder is capable of folding a 32-page signature.

b. Clarify any misconceptions.

SUMMARY

In this lesson you have seen a demonstration of the manual operation of the Cleveland Folder, Model MS. You have seen the machine in operation, folding printed sheets. The controls, upper and lower feeder boards, feed table, the step-by-step folding procedure, the deliver, the stackers, and lubrication and maintenance were discussed and explained. As offset pressmen, you have an additional responsibility for bindery equipment operation. Learn the operation of the bindery equipment by study and practice so that you may fulfill the MOS duties and responsibilities and qualify for promotion and later for a supervisory role.

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D3E20-B-010-020

STUDENT WORKBOOK

OFFSET PRESS OPERATION COURSE



JANUARY 1973

DEFENSE MAPPING SCHOOL- FORT BELVOIR, VIRGINIA

STOCK NUMBER T.043-BJ-SW-001

792

FOREWORD

The good student is usually the one who has mastered the techniques of taking good notes. He has found that a little extra effort spent recording the highlights of the instruction helps him in several important ways:

1. The fact that he is taking notes forces the student to concentrate on what the instructor is saying; and he must constantly evaluate the subject matter being presented in order to determine what is significant enough to be recorded and what may be omitted from his notes.

2. By having to formulate in his own words the instructor's explanation of an idea or principle, the student achieves a clearer understanding of what has been presented.

3. The very act of writing an idea down serves to impress it more forcibly upon the student's memory. When reviewed, this idea helps the recall of other related ideas.

4. A good set of notes affords the student the most rapid and reliable method of reviewing for examinations.

If notes are to be of maximum benefit to the student, they should have these characteristics: uniform quality; concise, but complete and accurate; so arranged that they provide a ready reference.

While each student to some extent develops his own note-taking procedure, the following practices are recommended to all students who desire to write notes which will provide maximum utility:

1. Record specific information and directions given by the instructor; in particular, those things written by the instructor on the blackboard. If a reference is given, record the name of the book and the page number.

2. Do not attempt to record everything the instructor says. Listen closely and digest his explanation of the particular idea or principle; then write down a condensation of it in your own words.

3. Use approved abbreviation whenever possible.

4. Underline important sub-topics and key words and phrases.

5. Use sketches and diagrams whenever applicable - a good sketch is often worth a thousand words.

6. Organize your work - guard against a cluttered outline.

7. If you find that you have failed to record some important information, either because it was not clear or because you fell behind in your taking, raise your hand and ask the instructor to repeat the information concerned.

8. At the close of the lesson, check over your notes to see if there are any omissions or portions that are not clear. Remember, it may be several days, or even weeks, before you look at these notes again, and they must be complete enough to be easily interpreted when used for purposes of review. If necessary, ask the instructor or another student to aid you in clarifying or completing portions of your notes that you have found to be deficient.

As an aid to your note taking, student outlines have been prepared for each of the lessons taught in the Offset Press Course. These have been bound together, following the order in which the lessons are taught. The main headings of each lesson are given with space provided underneath each for you to write your comments. Do not discard this booklet; it will be a valuable reference for you to take with you on your next assignment.

OFFSET PRESS OPERATION STUDENT WORKBOOK

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STUDENT ADVANCE SHEET

LESSON: Introduction to Offset Press Operation

OBJECTIVE: To introduce you to the principles of modern lithographic offset press operation, the instructional breakdown of the Offset Press Course, grading procedures, safety precautions you are required to follow. Upon completion of this lesson you can generally state the type of equipment used in the course, have an understanding of the grading system used, and be aware of all of the safety procedures that you will be required to follow 100% of the time while operating the offset press.

STUDY REFERENCES: None required for this lesson.

SUPPLEMENTARY INFORMATION: This lesson will be conducted in the following manner.

1. Lecture with questions for one hour.
2. Lead-through practical exercise: None
3. Student practical exercise: None

During the lesson each student will be required to fill out the forms (See APPENDICES I, II AND III). Each student will receive a copy of the Guide to Studying (See APPENDIX IV), a student workbook (See APPENDIX V), and copies of the manuals and materials listed in APPENDIX III. He will receive a list of safety rules (See APPENDIX VI to ANNEX A).

ANNEX A
83F20-B-010-020

OFFSET PRESS OPERATION

LESSON: Introduction to Offset Press Operation

OBJECTIVE: To introduce you to the principles of modern lithographic offset press operation, the instructional breakdown of the Offset Press Course, grading procedures, safety precautions you are required to follow. Upon completion of this lesson you can generally state the type of equipment used in the course, have an understanding of the grading system used, and be aware of all of the safety procedures that you will be required to follow 100% of the time while operating the offset press.

REFERENCES: TM 5-245, Chap 8, Section I

DEVELOPMENT

1. COURSE SEQUENCE

- a.
- b.
- c.
- d.
- e.
- f.
- g.
- h.
- i.

2. GRADES

- a.
- b.

3. OFFSET PRESS TERMINOLOGY

- a.
- b.

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c.

d.

4. OFFSET PRESS SPECIFICATIONS

a. ATF Chief 29 (DP) press

(1)

(2)

(3)

b. Harris LIG press

(1)

(2)

(3)

c. Other presses in use by the Army

d. Duplicating machines

5. THEORY OF OFFSET PRINTING

6. OPERATION OF THE OFFSET PRESS

a.

b.

c.

d.

e.

f.

g.

h.

762

i.

j.

k.

l.

m.

7. SAFETY RULES

- a. No loose clothing
- b. Tee-shirts
- c. No jewelry worn while operating equipment
- d. No tools, rags, or equipment on press
- e. No trash on press or floor
- f. Oil and grease wiped up immediately
- g. Press controls on "SAFE" when press is stopped
- h. Warning before starting press
- i. No adjustments while press is running
- j. No cleaning while press is running
- k. Keep hands off running equipment
- l. Wash chemicals off hands
- m. No horse play at any time
- n. Smoking only in authorized areas
- o. No running in the school
- p. Report all accidents and injuries immediately
- q. When in doubt, stop and ask an instructor

8. ADMINISTRATIVE DETAILS

a.

799

h

763

b.

c.

(1)

(2)

d.

SUMMARY

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STUDENT ADVANCE SHEET

LESSON: Paper Cutter Operation

OBJECTIVE: Upon completion of this lesson you will be required to the power paper cutter as part of each printing lesson. You will review each work order to determine the correct cutting specifications, make the necessary adjustment to the back plate, wind, jog, load and position the stock on the cutter motor, engage the safety operational handle, foot treadle and knife lever. This operation must be accomplished in accordance with requirements stated in the work order and a 100% safety performance must be observed during operation.

STUDY REFERENCES: TM 5-245, Chap 9, Section II

SUPPLEMENTARY INFORMATION: This lesson will be conducted in the following manner.

1. Demonstration: One hour
2. Lead-through practical exercise: None
3. Student practical exercise: Each student will be required to cut paper for each lesson in which paper is needed. Safety procedures must be followed at all times. Only one student at a time may operate the paper cutter. Students waiting to cut stock should practice winding and jogging the paper to insure that it is flush on the side and back when it is cut.

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ANNEX A
83F20-B-010-030

OFFSET PRESS OPERATION

LESSON: Paper Cutter Operation

OBJECTIVE: Upon completion of this lesson you will be required to operate the power paper cutter as part of each printing lesson. You will review each work order to determine the correct cutting specifications, make the necessary adjustment to the back plate, wind, jog, load and position the stock on the cutter bed. Following safety procedures you will start the cutter motor, engage the safety operational handle, foot treadle and knife lever. This operation must be accomplished in accordance with requirements stated in the work order and a 100% safety performance must be observed during operation.

REFERENCES: TM 5-245, Chap 9, Section II

KEY QUESTIONS:

1. What is the maximum amount of paper you can cut at one time?
2. What is the function of the foot treadle?
3. How can a dull knife be made to cut easier?

DEVELOPMENT

1. SAFETY CHECK

- a.
- b.

2. SAFETY PROCEDURES

- a.
- b.

3. OPERATION OF CONTROLS

- a.
- b.
- c.
- d.

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4. PREPARATION OF CUTTER FOR OPERATION

a.

b.

5. CUTTING STOCK

a.

b.

c.

SUMMARY

803

OFFSET PRESS OPERATION

LESSON: Offset Press Lubrication

OBJECTIVE: Given an offset press, appropriate publications, maintenance forms, tools, lubrication charts, proper grease and oil, and a list of safety rules, the student will perform a visual safety check on all assemblies, sub-assemblies, and components of the offset press. He must grease alimite fittings, lubricate all oil holes and automatic oil reservoirs, as prescribed in the lubrication order LO 5-6021-1 and the Harris Manual, while observing safety precautions at all times.

REFERENCES: TM 5-245, Chap 8, Par 8-3; Harris Manufacturer's Manual

KEY QUESTIONS:

1. What type of oil is used to lubricate the press?
2. What part of the LMG press is automatically oiled during operation?
3. What information is obtained from the oil pressure gages?
4. What type of grease is used to lubricate the offset press?
5. What safety precautions should you follow when lubricating the offset press?

DEVELOPMENT

1. SAFETY INSPECTION

a.

b.

2. OILING THE ATF CHIEF 29 DP PRESS

a.

(1)

(2)

b.

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768

3. OILING THE HARRIS LIG PRESS

a.

(1)

(2)

b.

(1)

(2)

4. GREASING THE ATF CHIEF 29 DP PRESS

a.

b.

c.

5. GREASING THE HARRIS LIG PRESS

a.

b.

6. MAINTENANCE FORM REQUIREMENT

SUMMARY

895

OFFSET PRESS OPERATION

LESSON: Controls, Feeder and Delivery Assemblies

OBJECTIVES: Given an offset press, offset press tools, paper, appropriate press publications and a list of safety rules, the student will properly prepare the feeder assembly and load 200 sheets of paper on the feeder board. The student must correctly wind, load and jog paper, placing it on the feeder board 1/8 of an inch off center and use all controls necessary to transfer each sheet of paper onto the conveyor board, practicing safety precautions at all times.

Given an offset press, appropriate offset press publications, assigned tools and a list of safety rules, the student must operate the feeder valve to bring a sheet of paper onto the conveyor board, position and adjust the various register mechanisms, parallel and center front guide bar. This must be accomplished so the side guide will properly position the paper and all registering mechanisms are operating correctly, practicing safety procedures at all times.

Given an offset press, appropriate offset press publications, tools, and a list of safety rules, the student will position, adjust and operate the various components of the delivery assembly including the operation of the automatic pile receder and continuous delivery mechanism. The student must position all the components of the delivery assembly so the sheets of printed paper drop correctly and the jogger blades position the paper into a neat stack as required. Safety procedures will be practiced at all times.

REFERENCES: TM 5-245, Chap 8, Sections II, III, & IV; TM 5-3610-202-15, Par 1-24 thru 1-45, 1-50, 1-51, 1-77 thru 1-85, 2-27 thru 2-48, 2-72 thru 2-74, 2-78 thru 2-101, 2-111 thru 2-115, 2-144 thru 2-155, pp 33 & 34; Harris Manufacturer's Manual, Par 6-22, 25, 45, 64, 98, 107, 113, & 117

KEY QUESTIONS:

1. What are the three positions of the selector switch?
2. How is the front guide bar adjusted?
3. When is the sheet flattener bar adjusted?
4. When properly adjusted, how far should the side guide push each sheet of paper?

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DEVELOPMENT

1. SHEET FEED SYSTEMS ATF CHIEF 29 DP PRESS

a.

b.

2. CONTROLS OF THE ATF CHIEF 29 DP OFFSET PRESS

a.

(1)

(2)

(3)

b.

c.

d.

(1)

(2)

e.

3. FEEDER ASSEMBLY ATF CHIEF 29 DP PRESS

a.

b.

c.

d.

e.

f.

g.

h.

4. CONVEYOR BOARD ASSEMBLY ATF CHIEF 29 DP PRESS

- a.
- b.
- c.
- d.

5. REGISTER DEVICES ATF CHIEF 29 DP PRESS

- a.
- b.
- c.
- d.
- e.
- f.

6. DELIVERY ASSEMBLY ATF CHIEF 29 DP PRESS

- a.
- b.
- c.
- d.
- e.
- f.
- g.
- h.

7. TRIP MECHANISMS ATF CHIEF 29 DP PRESS

- a.
- b.

8. COUNTER MECHANISM ATF CHIEF 29 DP PRESS

772

9. SHEET FEED SYSTEMS HARRIS LIG PRESS

a.

b.

10. CONTROLS OF HARRIS LIG PRESS

a.

b.

c.

d.

e.

(1)

(2)

f.

g.

h.

11. FEEDER ASSEMBLY HARRIS LIG PRESS

a.

b.

c.

d.

(1)

(2)

(3)

(4)

(5)

(6)

(7)

(8)

(9)

(10)

12. CONVEYOR BOARD ASSEMBLY HARRIS LYG PRESS

a.

b.

c.

d.

13. REGISTER DEVICES HARRIS LYG PRESS

a.

b.

c.

d.

e.

f.

g.

h.

i.

(1)

(2)

14. DELIVERY ASSEMBLY HARRIS LYG PRESS

a.

b.

c.

774

d.

e.

f.

g.

h.

15. TRIP MECHANISMS HARRIS LXG PRESS

a.

b.

16. COUNTER MECHANISM HARRIS LXG PRESS

APPLICATION

SUMMARY

811

OFFSET PRESS OPERATION

LESSON: Cylinder Assembly

OBJECTIVE: Given an offset press, necessary tools, appropriate offset press publications, offset press blanket and packing paper, the student will properly clean the blanket cylinder and blanket; determine blanket cylinder undercut, use a micrometer, measure the thickness of the blanket, select correct packing and secure blanket and packing to blanket cylinder. The student will use the micrometer to measure the blanket and packing to obtain proper printing pressure as prescribed by manufacturer, not to exceed a combined tolerance of .0015 of an inch between the plate and blanket cylinder and practice safety precautions at all times.

Given an offset press, necessary tools, appropriate offset press publications, offset plate and packing paper, the student will properly clean the plate cylinder and plate, determine the plate cylinder undercut, use a micrometer, measure the thickness of the plate, select correct packing and properly secure plate and packing to the plate cylinder. The student will use the micrometer to measure the plate and packing to obtain proper printing pressure as prescribed by manufacturer, not to exceed a combined tolerance of .0015 of an inch between the plate and blanket cylinders and practice safety precautions at all times.

REFERENCES: TM 5-245, Chap 8, Section V; TM 5-3610-202-15, Para 1-45 thru 1-49, 1-53, 1-54, 2-49 thru 2-59, 2-196, 2-201, 3-18, 3-20, pp 17, Figure 18, pp 24; Harris Manufacturer's Manual, Para 108 thru 112

KEY QUESTIONS:

1. What is the purpose of cylinder undercuts?
2. What is the desired printing pressure required between the plate and blanket cylinders?
3. What happens when the impression trips are activated?
4. How can you compensate for an image that is skewed on the plate?
5. How may image size be changed?

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776

DEVELOPMENT

1. CYLINDER SURFACES AND BEARERS ATF CHIEF 29 DP PRESS
 - a.
 - b.
2. PACKING BLANKET AND PLATE CYLINDERS ATF CHIEF 29 DP PRESS
 - a.
 - b.
 - c.
 - d.
 - (1)
 - (2)
 - (3)
3. PREPARE AND MOUNT BLANKET ATF CHIEF 29 DP PRESS
 - a.
 - b.
4. PREPARE AND MOUNT PLATE ATF CHIEF 29 DP PRESS
 - a.
 - b.
 - c.
5. IMPRESSION CYLINDER ADJUSTMENT ATF CHIEF 29 DP PRESS
 - a.
 - b.
 - c.
 - d.

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6. POSITION IMAGE ON PLATE CYLINDER ATF CHIEF 29 DP PRESS

- a.
- b.
- c.

7. CYLINDER SURFACES AND BEARERS HARRIS LIG PRESS

- a.
- b.

8. PACKING BLANKET AND PLATE CYLINDERS HARRIS LIG PRESS

- a.
- b.
- c.
- d.

- (1)
- (2)
- (3)

9. PREPARE AND MOUNT BLANKET HARRIS LIG PRESS

- a.
- b.

10. PREPARE AND MOUNT PLATE HARRIS LIG PRESS

- a.
- b.
- c.

11. IMPRESSION CYLINDER ADJUSTMENT HARRIS LIG PRESS

- a.
- b.

778

c.

d.

12. POSITION IMAGE ON PLATE CYLINDER HARRIS LIG PRESS

a.

b.

c.

APPLICATION

SUMMARY

815

OFFSET PRESS OPERATION

LESSON: Dampening Assembly

OBJECTIVE: Given an offset press, a nomenclature list, a set of dampening rollers, feeler strips, necessary tools, appropriate offset press publications and a list of safety rules, the student will properly install and with feeler strips adjust all dampening rollers in proper sequence, explain the functions of the water motion control and the preparation of fountain solution. The student will accomplish this by using the feeler strips to set the rollers and obtain an adequate water supply for the plate to keep it clean. Safety procedures will be practiced at all times.

Given an offset press, appropriate publications and a list of safety rules, the student will properly position water-on lever, ductor roller control knob, water motion control and operate the water motion throw-off handle and latch as prescribed in the appropriate offset press publications, correctly position all controls so that the non-image areas of the plate remain clean during operation and practice safety precautions at all times.

REFERENCES: TM 5-245, Chap 8, Section VI; TM 5-3610-202-15, Para 1-70 thru 1-76, 2-16 thru 2-22, 2-108 thru 2-110, 2-157 thru 2-162, 3-32, 3-33; Harris Manufacturer's Manual, Para 108 thru 112

KEY QUESTIONS:

1. Which roller of the dampening assembly should be adjusted first?
2. Which roller in the dampening assembly is not adjustable?
3. Which roller is the fountain roller paralleled to?
4. What is the desired pH reading of fountain solution for use with aluminum plates?

DEVELOPMENT

1. MAJOR COMPONENTS OF THE DAMPENING ASSEMBLY ATF CHIEF 29 DP PRESS

a.

b.

c.

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780

- d.
- e.
- 2. INSTALLATION AND ADJUSTMENT OF THE DAMPENING ASSEMBLY ATF CHIEF 29
DP PRESS
 - a.
 - b.
 - c.
 - d.
- 3. OPERATION OF THE DAMPENING ASSEMBLY CONTROLS ATF CHIEF 29 DP PRESS
 - a.
 - b.
 - c.
- 4. MAJOR COMPONENTS OF THE DAMPENING ASSEMBLY HARRIS LIG PRESS
 - a.
 - b.
 - c.
 - d.
 - e.
- 5. INSTALLATION AND ADJUSTMENT OF THE DAMPENING ROLLERS HARRIS LIG PRESS
 - a.
 - b.
 - c.
 - d.
 - e.
- 6. OPERATION OF DAMPENING ASSEMBLY CONTROLS HARRIS LIG PRESS

a.

b.

7. CARE AND CLEANING OF ROLLERS ATF CHIEF 29 DP AND HARRIS LIG PRESS

a.

b.

c.

8. FOUNTAIN SOLUTION AND PH CONTROL ATF CHIEF 29 DP AND HARRIS LIG PRESS

a.

b.

c.

d.

e.

APPLICATION

SUMMARY

OFFSET PRESS OPERATION

LESSON: Inking Assembly

OBJECTIVE: Given an offset press, appropriate offset press publications, a set of ink rollers, a nomenclature list, necessary tools, feeler strips, and a list of safety rules, the student will properly install and adjust all ink rollers with feeler strips in proper sequence as prescribed in the appropriate offset press publications. This will be accomplished by using the feeler strips to obtain an adequate transfer of ink to the image areas of the plate and student will practice safety precautions at all times.

Given an offset press, appropriate offset press publications and a list of safety rules, the student will identify procedures used to adjust ink fountain keys, operate automatic ink control unit and operate the ink motion throw-off handle as prescribed in the appropriate offset press publications. The student will correctly position all controls so that the ink will be properly transferred to the image area of the plate during operation and practice safety precautions at all times.

REFERENCES: TM 5-245, Chap 8, Section VII; TM 5-3610-202-15, Para 1-56 thru 1-68, 2-12 thru 2-15, 2-103 thru 2-106, 3-27 thru 3-31; Harris Manufacturer's Manual, Para 84 thru 97

KEY QUESTIONS:

1. What is the sequence for installing form rollers?
2. What adjustment is made first when setting the form rollers?
3. What is the function of the automatic ink control unit?

DEVELOPMENT

1. INKING ASSEMBLY, MAJOR COMPONENTS ATF CHIEF 29 DP PRESS

a.

- (1)
- (2)
- (3)
- (4)

819

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(5)

b.

(1)

(2)

(3)

(4)

(5)

2. INK ROLLERS, INSTALLATION AND ADJUSTMENT ATF CHIEF 29 DP PRESS

a.

(1)

(2)

(3)

b.

c.

d.

e.

f.

3. AUTOMATIC INK CONTROL UNIT ATF CHIEF 29 DP PRESS

a.

b.

c.

d.

e.

4. INKING ASSEMBLY, MAJOR COMPONENTS HARRIS LIG PRESS

a.

784

(1)

(2)

(3)

(4)

b.

(1)

(2)

(3)

(4)

(5)

(6)

(7)

5. INK ROLLERS, INSTALLATION AND ADJUSTMENT HARRIS LIG PRESS

a.

(1)

(2)

(3)

(4)

b.

c.

d.

e.

f.

g.

821

6. AUTOMATIC INK CONTROL UNIT HARRIS LIG PRESS

a.

b.

c.

d.

e.

APPLICATIONSUMMARY

786

OFFSET PRESS OPERATION

LESSON: Preparation of Press for Operation

OBJECTIVE: Given an offset press, paper, plate, blanket, ink, necessary tools, appropriate offset press publications and a list of safety rules, the student will, with material supplied, set the feeder and delivery assemblies, position and adjust the various register mechanisms on the conveyor board, mount plate and blanket to manufacturer's specifications, position and adjust dampening and inking assemblies, to include the selecting of the ink and fountain solution. The student will, by following instructions in the appropriate offset press publications, properly prepare all assemblies for operation and print three clean sheets while practicing safety precautions at all times.

REFERENCES: TM 5-245, Chap 8, Section IX; TM 5-3610-202-15, Para 2-25, 2-63 thru 2-71, 2-164 thru 2-199; Harris Manufacturer's Manual, Para 118 and 119.

KEY QUESTIONS:

1. How is the ink prepared for normal operation?
2. How is ink modified?
3. What is the procedure used in placing register marks on the plate?
4. What is the proper procedure for using the wash-up attachment?

DEVELOPMENT

1. INK PREPARATION

- a.
- b.
- c.
- d.

2. MAKE READY PROCEDURE

- a.
- b.

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c.

d.

e.

f.

g.

h.

3. WASH-UP PROCEDURES

a.

b.

APPLICATIONSUMMARY

OFFSET PRESS OPERATION

LESSON: Practice Printing I

OBJECTIVE: Given an offset press, paper, tools, manufacturer's manual, TM 5-3610-202-15, TM 5-245, and a list of safety rules, the student will make a visual safety check before starting the press, properly operate all assemblies in sequence and produce three printed sheets, inspect a printed sheet and when necessary twist or swing the plate, adjust side guide, make additions and deletions, and practice safety procedures at all times. This must be accomplished so that the image area of the printed sheet is positioned according to work order specifications thereby being able to obtain an OK to start the press run. The student will properly operate the press for practice practical exercise, produce clean printed sheets and during operation frequently inspect a sheet for quality under the supervision of an instructor. At the completion of the press run, he will, by following the procedures outlined in the appropriate offset press publication, process the plate and blanket and clean the press to the satisfaction of the supervisor. The students work will be individually critiqued and evaluated.

REFERENCES: TM 5-245, Chap 8; TM 5-3610-202-15, Chap 3; Harris Manufacturer's Manual

DEVELOPMENT

1. GUIDES TO PRACTICAL EXERCISE

a.

(1)

(2)

(3)

b.

2. PRESS TECHNIQUES

a.

b.

c.

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APPLICATION

NOTE: This area is for notes made during the practical exercise period. Students may draw diagrams to illustrate their notes.

SUMMARY

OFFSET PRESS OPERATION

LESSON: Printing Problems I

OBJECTIVE: To enable the student to recognize printing defects caused by improper operation of the offset press, methods of quickly locating maladjustments, and determining problem areas. The student will properly identify those types of printing problems which could occur during press operation and make corrections as required to produce a clean sheet and error free image on the finished printed product. An orientation to Process Camera activities will be given in the form of a tour of the Camera Section so the student can understand the inter-relationship of the Process Photo Section with the Press Section.

REFERENCES: TM 5-245, Chap 5, Appendix E; TM 5-3610-202-15, pp 74 thru 82

DEVELOPMENT

1. IDENTIFY AND LIST SOURCES OF PRINTING PROBLEMS

a.

(1)

(2)

(3)

b.

(1)

(2)

2. ISOLATE AND DETERMINE AREAS OF PRINTING PROBLEMS

a.

b.

c.

3. IDENTIFY SYMPTOMS OF PRINTING PROBLEMS ON THE PRESS

a.

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b.

c.

d.

4. TOUR OF THE PROCESS CAMERA SECTION

APPLICATIONSUMMARY

OFFSET PRESS OPERATION

LESSON: Printing Problems II-

OBJECTIVE: The student will identify symptoms of printing problems on the printed sheet, and make adjustments or take corrective action to solve these problems. The student must be able to identify these plate-related problems so that during offset press operation he will be able to make the necessary corrections in order to produce clean printed sheets. An orientation to the Platemaking Section will be held in the form of a tour in which plate problems will be discussed.

REFERENCES: TM 5-245, Chap 7, Appendix E; TM 5-3610-202-15, pp 74 thru 82

DEVELOPMENT

1. PRINTING PROBLEMS ON THE PRINTED SHEET

a.

(1)

(2)

b.

(1)

(2)

c. (1)

(2)

(3)

2. PLATE PROBLEMS

a.

(1)

(2)

(3)

829

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(4)

b.

(1)

(2)

(3)

(4)

(5)

(6)

(7)

(8)

(9)

3. TOUR OF PLATE SECTION

APPLICATION

SUMMARY

794

OFFSET PRESS OPERATION

LESSON: Printing Problems III

OBJECTIVE: This lesson is designed so that when a student is given an offset press which has been made ready for operation, appropriate offset press publications, necessary tools and supplies and a list of safety rules, the student will properly identify those types of printing problems which could occur during press operation and make correction as required to produce a clean sheet and error free image on the finished printed product, while practicing and observing all safety rules. He will be able to identify paper, blanket registration problems and understand how to remedy them.

REFERENCES: TM 5-245, Chap 8, Appendix E; TM 5-3610-202-15, pp 74 thru 82

DEVELOPMENT

1. IDENTIFY BLANKET PROBLEMS AND REMEDIES

a.

(1)

(2)

(3)

(4)

b.

(1)

(2)

(3)

(4)

(5)

c.

(1)

831

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(2)

(3)

2. IDENTIFY REGISTRATION PROBLEMS

3. IDENTIFY PAPER PROBLEMS

a.

b.

c.

d.

APPLICATION

SUMMARY

796

OFFSET PRESS OPERATION

LESSON: Printing of a Three-Color Map

OBJECTIVE: Given an offset press, tools, manufacturer's manual, TM 5-245, TM 5-3610-202-15, paper, cleaning materials, and a list of safety rules, the student will make a visual safety check before starting the press, properly operate all assemblies in sequence and produce three printed sheets, inspect a printed sheet and when necessary twist and swing the plate, adjust side guide, make additions and deletions, and practice safety precautions at all times. This must be accomplished so that the image area on the printed sheet is centered side to side and parallel to the gripper edge, thereby being able to obtain an OK to start the press run. The student will properly operate the offset press that he was assigned to during the first practice practical exercise, produce clean printed three-color map sheets and during operation frequently inspect a sheet for quality. Registration of the three colors must be within a tolerance of 0.02 of an inch as specified in AR 115-11. At the completion of the press run, he will process the plate and blanket, and clean the press to the satisfaction of the supervisor, following safety procedures at all times.

REFERENCES: TM 5-245, Chap 8; TM 5-3610-202-15, Chap 3; Harris Manufacturer's Manual

DEVELOPMENT

1. PRINT A THREE-COLOR MAP

a.

b.

(1)

(2)

(3)

c.

d.

2. ADDITIONAL REQUIREMENTS

a.

833

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b.

c.

APPLICATIONSUMMARY

OFFSET PRESS OPERATION

LESSON: Printing of a Five-Color Map

OBJECTIVE: Given an offset press, paper, tools, manufacturer's manual, TM 5-245, TM 5-3610-202-15, cleaning materials and a list of safety rules, the student will make a visual safety check before starting the press, properly operate all assemblies in sequence and produce three printed sheets, inspect a printed sheet and when necessary twist and swing the plate, adjust side guide, make additions and deletions on the press plate, and practice safety procedures at all times. This must be accomplished so that the image is centered side to side and parallel to the gripper edge of the sheet, thereby being able to obtain an OK to start the press run. The student will properly operate the offset press, as practiced in the preceding practical exercises, to produce clean printed five-color map sheets in accordance with the criteria established in the three-color map printing exercise. During operation the student will frequently inspect sheets for quality. The registration of the five colors must be within a tolerance of 0.02 of an inch as specified in AR 115-11. At the completion of printing the five-color map the student will be required to print a photomap, maintaining ink and water balance to achieve a printed halftone that is sufficiently in contrast to meet the satisfaction of the instructor. At the completion of each press run, he will process the plate and blanket and clean the press to the satisfaction of the instructor. Safety procedures will be followed at all times.

REFERENCES: TM 5-245, Chap 8; TM 5-3610-202-15, Chap 3; Harris Manufacturer's Manual

DEVELOPMENT

1. PRINT A FIVE-COLOR MAP AND PHOTOMAP

a.

b.

(1)

(2)

(3)

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835

40

799

(4)

(5)

c.

d.

e.

2. ADDITIONAL REQUIREMENTS

APPLICATION

SUMMARY

41

836

OFFSET PRESS OPERATION

LESSON: Multilith Press 1250

OBJECTIVE: To expose the student to the operational procedures of the Multilith Press 1250 under supervision he will operate the Multilith Press 1250 using preventative maintenance techniques and observing safety precautions at all times. The student will be required to perform all necessary before operation procedures, i.e., load the feeder, mount the plate and blanket, and make necessary adjustments to produce clean printed sheets.

REFERENCES: Addressograph Multilith Corp Manufacturer's Manual

KEY QUESTIONS:

1. What are the maximum and minimum stock and image sizes?
2. How does the feeder operate?
3. What are the components of the cylinder, dampening, and timing assemblies?
4. How is preventive maintenance performed?
5. What are the necessary safety precautions?

DEVELOPMENT

1. STOCK AND IMAGE SIZES
 - a.
 - b.
 - c.
2. ELECTRICAL CONTROL AND SPEED
 - a.
 - b.
 - c.
3. FEEDER OPERATION
 - a.

837

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- b.
- c.
- d.
- e.
- f.
- g.
- h.
- i.
- j.

4. CYLINDER ASSEMBLY

- a.
- b.
- c.

(1)

(2)

5. DAMPENING ASSEMBLY

- a.
- b.
- c.
- d.

(1)

(2)

(3)

6. INKING ASSEMBLY

- a.

802

b.

c.

d.

e.

(1)

(2)

(3)

7. PREVENTIVE MAINTENANCE

a.

b.

c.

APPLICATION

SUMMARY

839

OFFSET PRESS OPERATION

LESSON: Paper Stitching Machine

OBJECTIVE: To acquaint the student with the operational procedures of the paper stitching machine, types of wire, types of stitches, preventive maintenance, and the safety precautions to be followed. Upon completion of this lesson the student will be able to identify the types of wire, types of stitches 100% of the time. He will also be able to perform the preventive maintenance required to keep the paper stitching machine 100% operational.

REFERENCES: TM 5-245, Chap 9, Section IV

KEY QUESTIONS:

1. How is the stitcher threaded?
2. What types of wire are used in the stitcher?
3. What types of stitches are made by the stitcher?
4. How is the stitcher adjusted for stitching thickness?
5. What safety measures are necessary when operating the paper stitcher?

DEVELOPMENT

1. THREADING THE PAPER STITCHER

- a.
- b.
- c.
- d.

2. TYPES OF STITCHING WIRE

- a.
- b.

3. TYPES OF STITCHES USED IN BINDING

- a.

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804

b.

4. SETTING FOR STITCHING THICKNESS

a.

b.

c.

5. PAPER STITCHER MAINTENANCE

a.

b.

c.

APPLICATION

SUMMARY

811

OFFSET PRESS OPERATION

LESSON: Paper Folding Machine

OBJECTIVE: To orient the student to the operation of the paper folding machine so that he will be able to identify types of folds, and state the method of adjusting the folder. The student will be able to perform preventive maintenance and observe proper safety procedures at all times.

REFERENCES: TM 5-245, Chap 9, Section III

KEY QUESTIONS:

1. What weight stock can be efficiently run on this folder?
2. What is the purpose of the caliper?
3. How many page signature is the folder capable of folding?

DEVELOPMENT

1. CONTROLS
 - a.
 - b.
2. UPPER LOADING BOARD
 - a.
 - b.
3. LOWER FEEDER BOARD
 - a.
 - b.
4. FOLDING PROCEDURE
 - a.
 - b.
5. DELIVERY AND STACKER
 - a.

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806

b.

6. LUBRICATION AND MAINTENANCE

a.

b.

APPLICATION

SUMMARY

813

OFFSET PRESS OPERATION

LESSON: Preparation of a Press Van for Operation :

OBJECTIVE: To acquaint the student with the procedures for preparing an offset press van for field operation, leveling the van, water supply, power source, communications and equipment common to all reproduction vans. Upon completion of this lesson the student will be able to state how the van is leveled, where the water supply comes from, how the power source is hooked up, how communications between vans is accomplished, and the equipment that is common to all reproduction vans 100% of the time.

REFERENCES: TM 5-245, Chap 10

KEY QUESTIONS:

1. How much should the van be jacked up?
2. What voltage is required for the press van?
3. How is electrical power supplied to the reproduction vans?

DEVELOPMENT

1. THE PRESS VAN

- a.
- b.

2. SELECTING A FIELD SITE FOR VAN OPERATION

- a.
 - (1)
 - (2)
 - (3)
 - (4)
 - (5)
 - (6)

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b.

(1)

(2)

(3)

(a)

(b)

(c)

(d)

(e)

(f)

(g)

(h)

(4)

3. CAPABILITIES AND CHARACTERISTICS COMMON TO ALL REPRODUCTION VANS

a.

b.

c.

d.

e.

(1)

(2)

(3)

APPLICATIONSUMMARY

OFFSET PRESS OPERATION

LESSON: Practice Printing II

OBJECTIVE: Given an offset press, other than the press operated in the three previous practical exercises, i.e., ATF Chief 29 DP press or Harris LXG press, paper, offset press tools, TM 5-245, TM 5-3610-202-15, Harris Manufacturer's Manual, and a list of safety rules, the student will make a visual safety check before starting the press, properly operate all assemblies in sequence and produce three printed sheets, inspect a printed sheet, and when necessary twist or swing the plate, adjust side guide, make additions and deletions, to produce a clean printed sheet. The student will note the differences between the presses while developing a degree of skill that enables him to operate this press and obtain an OK on the printed sheet prior to commencing the press run. At the completion of the press run, he will, by following the procedures outlined in the lesson on preparation of a press for operation, process the plate and blanket, and clean the press to the satisfaction of the instructor. Safety procedures will be followed at all times.

REFERENCES: TM 5-245, Chap 8; TM 5-3610-202-15, Chap 3; Harris Manufacturer's Manual

DEVELOPMENT

1. PRACTICE PRINTING (HARRIS LXG) OR (ATF CHIEF 29)

- a.
- b.
- c.

2. PERFORMANCE STANDARDS

- a.
- b.
- c.

APPLICATIONSUMMARY

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GLOSSARY OF PHOTOLITHOGRAPHIC TERMS



740-301	740-302
740-303	740-304
690-620	690-621

DEFENSE MAPPING SCHOOL — FORT BELVOIR, VIRGINIA

FORWARD

This Glossary is designed as an aide for personnel studying Graphic Arts who have a limited knowledge of the Graphic Arts field. More technical definitions may be found in the following references:

DoD Glossary of Mapping, Charting, and Geodetic Terms

TM 5-245 Offset Photolithography and Map Reproduction

Lithographers 1 & C, Rate Training Manual, Navpers 10454-B

The Lithographers Manual, 4th Edition, The Graphic Arts Technical Foundation, Inc.

Wilbur E. McCullough
WILBUR E. MCCULLOUGH
Chief, Graphic Arts Division

GLOSSARY

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<u>TERM</u>	<u>DEFINITION</u>	<u>USE</u>
1. ABERRATION	A general term for that error in a lens which causes the light rays from an object to fail to converge at a single point (or focus) after passing through the lens. (Also see chromatic aberration and spherical aberration).	
2. ABRASIVE	A hard substance used in grinding or polishing.	Sand is an <u>abrasive</u> material.
3. ABSORPTION	The partial loss of light passing through a material, such as a lens.	A red filter <u>absorbs</u> all other colors while allowing red to pass through it.
4. ACCELERATOR	Any chemical used to speed up the developing of a photograph. It is usually an alkali.	
5. ACETATE	A nonflammable plastic sheet used as a base for photographic film. Also used as a drafting base for color separation manuscripts and overlays.	
6. ACETIC ACID	A sour, colorless, liquid compound having a sharp odor.	<u>Acetic acid</u> is used as a counteretch in plate processing. It is also used to neutralize alkaline developers.
7. ACHROMATIC	Colorless	A lens which allows all colors to pass through equally is <u>achromatic</u> . (Opposite to a lens where absorption takes place).
8. ACID	A sour tasting substance which will change blue litmus paper to red.	Counteretch is an <u>acid</u> .
9. ACROSS THE GRAIN	The direction at right angles to the fibers in a sheet of paper.	
10. ACTINIC LIGHT	That light which will expose sensitized photographic films, paper, or plates.	Arc lamps, mercury vapor lamps, and photo-flood bulbs produce <u>actinic light</u> .
11. ADDITIVE PROCESS	A photographic color process which produces color by combining separate primary colors.	By combining all the primary colors through the <u>additive process</u> , white light will be produced.
12. ADSORPTION	The sticking to a surface of a solid by a gas or liquid.	Ink is held on a plate by <u>adsorption</u> .
13. AERIAL PHOTOGRAPH	A photograph of a portion of the earth's surface taken from the air.	

<u>TERM</u>	<u>DEFINITION</u>	<u>USE</u>
14. AFFINITY	Having a natural attraction.	
15. AIR BELL OR AIR BUBBLES	Small pockets of air which are trapped on the surface of a photographic film or plate during processing which leave small spots undeveloped.	
16. ALKALI	A substance which can neutralize acid. Used as an accelerator in photographic and plate-processing developers.	Ammonia water is an <u>alkali</u> .
17. AMMONIA PROCESS	See diazo compounds.	
18. AMMONIA WATER	A strong alkaline solution used to alkalinize plate-processing sensitizer and to soften exposed sensitizer for development.	
19. ANASTIGMAT	A lens which has been corrected for astigmatism and, therefore, focuses vertical and horizontal light rays with equal brightness and clarity.	<u>Anastigmatic</u> lenses are free from most common aberrations.
20. ANGLE OF FIELD	Generally, the field-of-view covered by a lens. Lenses are normally classified according to their angle of coverage (ie, narrow-angle, normal-angle, wide-angle, and super-wide angle).	
21. ANGSTROM UNIT (A)	A unit of measure equal to one ten-thousandth of a micron, one-tenth of a millimicron, or ten-millionth of a millimeter.	The wave lengths of light rays are measured in <u>angstrom units</u> .
22. ANHYDROUS	Completely lacking water, especially water of crystallization.	Most chemical compounds contain some water and therefore are not <u>anhydrous</u> .
23. ANILINE	Amino-benzene, an oily, organic compound derived from coal tar which is the base compound of most photographic developing agents.	
24. ANTITHALATION BACKING	An opaque coating applied to the back of film to prevent reflection from the back surface of the film base. (See opaque)	
25. APERTURE	The lens opening (or setting) that regulates the amount of light reaching the film.	
26. APLANATIC LENS	A lens which has been corrected for spherical aberrations and which will give reasonably sharp definition at full aperture.) (f)	

<u>TERM</u>	<u>DEFINITION</u>	<u>USE</u>
27. APOCHROMATIC LENS	A lens which has been corrected for spherical and chromatic aberrations. A true apochromatic lens has been corrected for three or more colors.	
28. ASTIGMATISM	A lens defect or aberration in which light rays from a point fail to meet in a focal point, resulting in an imperfect image.	The blurred image resulted from an <u>astigmatism</u> of the lens.
29. AUTOSCREEN FILM	A photographic film which has a half-tone screen built in to it.	Half-tone negatives are automatically produced when using <u>autoscreen</u> film.
30. AVOIRDUPOIS	A system of weights and measures consisting of grains, ounces, pounds, fluid ounces, and quarts.	The <u>avoirdupois</u> system is used mainly in the United States and Great Britain.
31. AXIS	See optical axis.	
32. BACK UP	An image printed on the reverse side of a sheet already printed on one side. Also the printing of such images.	
33. BASE COLOR	The color printed on a multicolor map to which succeeding colors are registered.	The first color printed on a map is the <u>base color</u> .
34. BAUME	A unit of measure used to express density of liquids.	The mixture of acacia gum and water is measured to 14 <u>baume</u> .
35. BEARERS	Steel rings on the ends of press cylinders that make rolling contact for proper meshing of the driving gears. These rings provide a fixed distance between cylinders.	
36. BITE	A surface characteristic of paper which causes it to accept ink, pencil, or other imaging material.	
37. BLANKET DUST	A mixture of chalk and powdered sulfur dusted on offset press blankets to remove tackiness.	
38. BLANKET, OFFSET	Sheet of vulcanized rubber with a fabric base used on an offset press to transfer an inked image from the plate to the paper.	
39. BLEED	Printing area which extends over the edge of a finished sheet of paper. Also color overlap usually owing to slight variations in register.	
40. BLIND IMAGE	An image on a plate that will not accept ink.	

<u>TERM</u>	<u>DEFINITION</u>	<u>USE</u>
41. BLUELINE	Photographically-prepared image in blue lines on acetate, metal plates, or paper; used for paste-up and color separation work.	
42. BLUEPRINT	A sensitized contact paper yielding a blue image upon development with water.	
43. BROMIDE PAPER	A photographic printing paper using an emulsion composed largely of silver bromide.	
44. BUFFER	Agent used to control the chemical activity of a solution.	A <u>buffer</u> is used to maintain constant pH of a fountain solution.
45. BURN	The process of exposing a plate.	
46. BURNISH	To remove small unwanted images from a plate. An "etchstick" or "snakeslip" is used.	You <u>burnish</u> a plate to remove a scratch.
47. CALENDER	The process of making a glossy surface on paper or cloth by pressing between rollers. Done during the paper-making process.	
48. CAMERA	An optical device (series of lenses) for projecting an image of an external subject onto a photographically sensitized film inside a lightproof box.	
49. CANADA BALSAM	A thick, yellow fluid used as a transparent cement to join lens elements and screens.	<u>Canada balsam</u> transmits light the same as glass.
50. CARBON	The chemical element found in black carbon rods.	<u>Carbon</u> rods are used in arc lamps to produce intense white light for photography.
51. CARTOGRAPHY	The art of making maps or charts.	
52. CATCHING UP	Term used to indicate that non-image areas of a plate are beginning to take ink.	
53. CAUSTIC SODA	See sodium hydroxide.	
54. CELLULOSE TAPE	A strong adhesive on a cellulose base, also known as scotch tape.	Negatives are spliced together with <u>cellulose tape</u> .
55. CHALK	Powdered limestone used to dry printing ink.	
56. CHALKING	Improper drying of printing ink which causes the pigment to dust off, because of the lack of binding vehicle (or carrier), caused by to rapid absorption of the vehicle into paper.	

<u>TERM</u>	<u>DEFINITION</u>	<u>USE</u>
57. CHROMATIC ABERRATION	The distortion of rays of the various wavelengths of colors through an uncorrected lens.	
58. COATED STOCK	Paper which has been coated with a mineral substance such as clay, satin white, or one of several other substances which have an affinity for ink. Casein is used as the adhesive which holds the coating onto the body stock.	We print photo-maps on <u>coated stock</u> .
59. COATING	1. Mineral substances used in preparing coated stock. 2. Light sensitive solutions on plate surfaces which make it image receptive.	
60. COLLATE	To assemble pages, signatures, plates, etc. in correct order.	This Glossary was <u>collated</u> before it was stapled.
61. COLOR CORRECTED LENS	A lens which has been constructed to bring all light waves to the same focus plane.	An apochromatic lens is a <u>color corrected lens</u> .
62. COLOR FILTER	A sheet of dyed glass, gelatin or plastic used in photography to absorb certain colors and permit transmission of others. (See absorption)	
63. COLORPROOF	A single copy of each color of a multicolor printing, or a composite copy of all the colors.	
64. COLOR PULLS	Single impressions, printed in black from a set of two or more color plates.	<u>Color pulls</u> are photographed to make new negatives, or used as field check sheets or edit sheets.
65. COLOR SEPARATION	1. A photographic negative exposed through a color filter so that only one of the primary colors is recorded. 2. The process of preparing separate drawings or negatives for each color required in the production of a multicolor print.	
66. COMBINATION PLATE	Halftone and line work on one plate. Also two or more subjects on one plate.	
67. COMPARATOR	A precision optical instrument used to determine the location (rectangular coordinates) of a point with respect to another point on any flat surface.	
68. COMPLEMENTARY COLORS	Any two colors which combine to produce white or gray.	

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<u>TERM</u>	<u>DEFINITION</u>	<u>USE</u>
69. COMPOSITE	Reproduction from a series of images. A print made by exposing several color-separation negatives on a single sheet of paper, plastic, or film.	A color proof is a <u>composite</u> .
70. CONTACT NEGATIVE	A negative made by placing an unexposed film in contact with a positive, exposing it to light, and then processing to develop the image.	
71. CONTACT POSITIVE	A positive made by placing an unexposed film in contact with a negative, exposing it to light, and then processing to develop the image.	
72. CONTACT PRINTING FRAME	A device for holding a negative or positive transparency in contact with sensitized material for exposure to light. The light source may or may not be a separate element.	
73. CONTACT SCREEN	A halftone screen made on a film base. When placed in direct contact with the film or plate, a halftone pattern is obtained from a continuous tone, or solid, original.	
74. CONTINUOUS TONE	An image which has not been screened and contains unbroken shades, varying from black to white. May be in either positive or negative form.	
75. CONTRAST	The actual difference in density between the light and dark areas on a negative or positive. Where there is little difference, copy is said to be "flat". Strong difference is said to be "contrasty".	
76. COPY	The original manuscript or text furnished for reproduction.	
77. COPY PREPARATION	The assembling into proper position of the text and art to be photographed for reproduction.	
78. CORNER MARKS	Small crosses used to register color printing.	
79. COUNTER-ETCH	The use of certain acid solutions to make a plate able to receive an inked image.	
80. C.P.	Abbreviation for chemically pure.	
81. CROP	To trim or cut off unneeded parts of an image to improve balance or to draw attention to certain portions.	

<u>TERM</u>	<u>DEFINITION</u>	<u>USE</u>
82. CRYSTALS	Solid form of chemical elements.	
83. CULTURE	Terrain features constructed by man.	The <u>culture</u> negative identifies man-made objects.
84. DAMPENERS	Cloth-covered (or paper-covered) rollers that distribute the dampening solution to the pressplate.	
85. DARKROOM	A darkened room used for the development of film.	
86. DEFINITION	Degree of clarity and sharpness of an image.	
87. DENSITOMETER	An electric instrument for optical density or tone. "Transmission densitometers" measure the full density range of negatives. "Reflective densitometers" measure the reflection range of opaque copy.	
88. DENSITY	The quantity of metallic silver per unit area in negatives and positives.	
89. DEPTH OF FIELD	The distance between nearest and farthest point from the camera which are in focus.	A process camera has a very small <u>depth of field</u> .
90. DEPTH OF FOCUS	The distance that the focal plane can be moved forward or backward from the point of exact focus, and still give an image of acceptable sharpness. (See focal plane).	
91. DESENSITIZING	Chemical treatment of a plate to make the nonimaged areas unreceptive to ink.	Use a <u>desensitizing</u> chemical to remove the unexposed coating from the plate.
92. DEVELOPER	1. The solution used to make the image on film visible. 2. A desensitizing chemical.	
93. DEVELOPMENT	The process of making images on film or plates visible.	
94. DEVELOPING INK	A greasy liquid applied to plate images to protect the image while the plate is processed.	
95. DIAPHRAGM	An adjustable aperture (or opening) which controls the amount of light passing through the lens.	
96. DIAZO COMPOUNDS	Dye compounds that are sensitive to light, used in coating presensitized plates.	
97. DIFFERENTIAL SHRINKING	The variation in contraction along and across the grain of photographic film, paper, and map stock.	

<u>TERM</u>	<u>DEFINITION</u>	<u>USE</u>
98. DIFFRACTION	The bending of light waves around the edges of opaque objects.	
99. DIFFUSION	A type of reflection in which the reflected rays are scattered in all directions.	
100. DIMENSION MARKS	Marks placed on copy showing the overall size of the image.	
101. DIMENSIONAL STABILITY	Ability to maintain original size. Resistance to changes in moisture content and temperature (especially in paper).	
102. DIRECT POSITIVE	A positive image obtained without the use of a negative.	
103. DODGING	The process of holding back light from certain areas of a sensitized surface to avoid overprinting those areas.	
104. DOTS, HALFTONE	The small, regular marks formed by a halftone screen, which make up a image.	
105. DOUBLE BURN	See multiple burn.	
106. DRAINAGE	All features associated with water.	The <u>drainage</u> negative is registered to the "V"s of the contour.
107. DRIER	A compound added to printing ink to accelerate drying.	
108. DUCTOR ROLLER	Press rollers that are used to control the transfer of ink or water from the fountain roller to the distributor roller by alternately contacting each.	
109. DUMMY	A draft drawing or layout showing position of text and art work, used as a guide for reproduction.	Always check the finished work with the <u>dummy</u> .
110. DUPLICATE NEGATIVE	A negative made from another negative without making a positive.	
111. ELEVATION TINTS	A method of showing relief (ground elevation) on maps by using different colors for those areas which lie between different elevation levels.	
112. EMBOSSED	Image swelling on an offset blanket resulting from absorption of ink solvents.	<u>Embossing</u> can be removed by washing and drying the blanket (by evaporation).
113. EMULSION	A light-sensitive coating used on photographic films, plates or paper.	

<u>TERM</u>	<u>DEFINITION</u>	<u>USE</u>
114. EMULSION SIDE	That side of the photographic film on which the light-sensitive coating is placed.	
115. EMULSION-TO-BASE EXPOSURE	A contact exposure in which the emulsion of the copying film is on the side of the film opposite to that in contact with the sheet being copied.	An <u>emulsion-to-base exposure</u> produces a copy which is wrong-reading through the base.
116. EMULSION-TO-EMULSION EXPOSURE	A contact exposure in which the emulsion of the copying film is in contact with the emulsion of the sheet being copied.	An <u>emulsion-to-emulsion exposure</u> produces a copy which is right-reading through the base.
117. EMULSIFICATION	Absorption of excessive water by ink, resulting from use of too much drier or water, too little acid or a poor ink.	
118. ENLARGEMENT	A reproduction made larger than the original. Also called a blow-up.	
119. EQUIVALENT FOCAL LENGTH	The distance measured along the lens axis from the rear nodal point of a lens to the plane of best average definition (focus).	
120. ETCH	1. Chemical treatment of a plate to make nonprinting areas grease-repellant and water receptive. 2. To remove selected areas of the emulsion either chemically or manually.	
121. ETCH SLIP	A pencil-shaped abrasive used in removing unwanted marks on a plate. It is sometimes called a "snake-slip".	
122. EXPOSURE	The act of subjecting light-sensitive material to a light source (actinic rays) for a specific time.	
123. EXTENDER	A additive used to improve working properties of ink or to reduce color intensity. Also used to increase quantity of ink.	
124. EXTENSION, BELLOWS	Distance between the lens and the surface of the photographic film.	
125. FACE	The light-sensitive side of a negative or the printing surface of a plate.	Etching is done on the <u>face</u> side of a negative.
126. FARMER'S REDUCER	A solution used in processing exposed photographic film to increase the contrast of the negative; used to clean the transparent areas of negatives and to reduce halftone dot size.	

<u>TERM</u>	<u>DEFINITION</u>	<u>USE</u>
127. FELT SIDE	The top or smooth side of paper. It is the side of the paper which was contacted by the felt belt for removal of moisture during manufacture.	This <u>felt side</u> is the correct side of the paper for printing.
128. FILM	A thin, flexible transparent sheet of plastic material to which a light-sensitive coating (emulsion) has been applied.	
129. FILM SPEED	A number assigned to a photographic emulsion to grade its sensitivity to light as compared to other emulsions.	
130. FILTER	A material that selectively absorbs some types of light rays while allowing others to pass. (See color filter).	
131. FILTER FACTOR	A number used to increase exposure mathematically when a filter is being used.	
132. FIX	To make the developed photographic image permanent by removing the unexposed light-sensitive material from the emulsion.	
133. FIXING BATH	A solution commonly known as "hypo" used to fix photographic images.	
134. FLASH EXPOSURE	An extra exposure used when making a halftone to strengthen dots in shadow areas. Usually made with a small lens aperture to a sheet of white paper or to a flashlamp.	
135. FLAT	1. Lithography. The assembly of negatives on goldenrod paper for contact exposure with a sensitized plate. 2. Photography. Lacking in contrast.	
136. FOCAL LENGTH	The distance between the optical center of a lens and the point at which an object image is in sharp focus.	
137. FOCAL PLANE	The flat surface on which the rays of light projected through the lens are focused. The photographic film occupies the focal plane.	
138. FOCUS	The point at which light rays converge to form an image after passing through a lens.	
139. FOG	Cloudiness on transparent areas of negatives. Caused by either stray light or improperly made solutions.	

<u>TERM</u>	<u>DEFINITION</u>	<u>USE</u>
140. FORMALIN	A powerful reducer used as a preservative for photographic emulsions.	
141. FORM ROLLERS	Those rollers on an offset press which contact the pressplate.	
142. FOUNTAIN SOLUTION	A desensitizing solution used to dampen the plate and keep non-image areas from accepting ink.	
143. FRENCH CHALK	Powder used to dust inked images in plate processing. Used in combination with powdered sulfur as a blanket dust.	
144. FRILLING	The separation along the edges of photographic emulsion from its base.	
145. FUGITIVE	An ink that fades.	
146. GAMMA	A measure of the development and the contrast of the photographic material.	
147. GATHER	To collate for binding.	
148. GEAR STREAKS	Marks across printed sheet caused by irregularities in the meshing of cylinder gears.	Incorrect packing will cause <u>gear streaks</u> .
149. GOLDENROD PAPER	Opaque paper used as a base for layouts. Also called masking paper.	
150. GRADATION	The range of tones from brightest highlights to deepest shadows.	
151. GRADIENT TINTS	See elevation tints.	
152. GRAIN	1. Alignment of paper fibers resulting from machine movement during manufacture. 2. The distribution of silver particles in photographic emulsions.	
153. GRAINED SURFACE	The rough, irregular surface of a plate.	
154. GRANULARITY	Graininess of a developed photographic image, evident particularly on enlargements.	
155. GRAVURE	A printing method in which the ink-bearing area of the plate is composed of small holes of varying depths. These are filled with ink which is then transferred to the paper.	
156. GRAY-SCALE	A strip of standard gray tones, ranging from white to black, used to measure tonal range.	

<u>TERM</u>	<u>DEFINITION</u>	<u>USE</u>
157. GRID	A system of parallel lines placed on maps, by which points on the ground are located.	The <u>grid negative</u> is registered to the culture negative.
158. GRIPPER	A small clamp which holds paper as it passed through the press.	
159. GRIPPER EDGE	Leading edge of the press sheet as it travels into the press.	
160. GRIPPER MARGIN (BITE)	An unprinted area allotted for grippers to hold paper.	
161. GROUND GLASS	The focusing glass in the focal plane of a camera; used to check for sharpness and size.	
162. GUIDES	Mechanical stops used for positioning paper on a press.	
163. GUM ARABIC	Used in fountain solutions. Also as an adhesive in copy layout or bookbinding.	<u>Gum arabic</u> is ink-repellent.
164. HALATION	A blurring of a photographic image because of light reflection from the film base.	
165. HALFTONE	A printed image which is made up by a series of evenly spaced dots of varying sizes and shape.	
166. HALFTONE SCREEN (GLASS)	A regular network of opaque lines crossing at right angles, producing transparent square openings.	A <u>halftone screen</u> is used to photographically break up a solid image into a pattern of small dots.
167. HALFTONE-TINT NEGATIVE	A halftone negative used with a continuous-tone negative to produce a halftone.	
168. HALIDES (OR HALOIDS)	Chemical compounds found in the emulsion on photographic film.	
169. HAND PROOF	A proof of a plate made on a manual (hand proof) press. Usually done for multicolor work.	
170. HAND ROLLER	A leather-covered wood roller.	A <u>hand roller</u> is used to apply ink by hand to a lithographic plate.
171. HIGHLIGHT HALFTONE	A halftone in which highlights are not screened.	A <u>highlight halftone</u> is used to increase the contrast.
172. HIGHLIGHTS	Portions of an image from which the greatest amounts of light are reflected.	<u>Highlights</u> are light or white areas.
173. HUE	Color.	
174. HUMIDITY	A measure of moisture content of air.	

<u>TERM</u>	<u>DEFINITION</u>	<u>USE</u>
175. HYDROCHLORIC ACID	A counteretch used on plates.	
176. HYDROMETER	An instrument used for measuring density of liquids. (See baume)	
177. HYDROQUINONE	A reducer used in photographic developer.	
178. HYGROMETER	An instrument used for measuring moisture content of air.	
179. HYPO	A chemical used to fix a photographic image (see fix).	
180. HYGROSCOPIC	The ability of material to absorb moisture and then to expand in size.	
181. IMAGE	That portion of a photographic negative, and a plate, which is intended for reproduction.	
182. IMPOSITION	Positioning and assembling negatives or positives on a flat (see flat).	
183. IMPRESSION	Inked image received by a sheet of paper in a press.	
184. INFRARED	Those light rays beyond the red end of the visible spectrum. Also called thermal or heat waves.	
185. INK	A combination of pigments, vehicles, and greasing agents used in printing to produce an impression.	
186. INVAR SCALE	A ruler used to check image size.	The <u>invar scale</u> is calibrated in inches and centimeters.
187. INTENSIFY	Depositing some metal on a negative to increase density and contrast.	
188. IRON BLUES	Blue ink pigments made from iron.	Prussian, mildri, and uronze blue are <u>iron blues</u> .
189. JOG	Aligning paper into a uniform stack.	
190. KEY	The principal flat to which other flats are positioned.	The culture negative is the <u>key</u> for a five-color map.
191. KISS PLATE	A plate used to make an addition or correction to a previously printed sheet.	
192. KISS PRESSURE	Minimum pressure at which proper ink transfer is possible.	

<u>TERM</u>	<u>DEFINITION</u>	<u>USE</u>
193. LAKES	Ink pigment obtained from coal-tar dyes.	
194. LAKETINE	A colorless reducer used in ink to reduce color strength.	
195. LATENT IMAGE	An invisible image which becomes visible upon processing.	
196. LAY	The arrangement of printed forms on the press sheet.	
197. LAYOUT	A design for positioning of negatives on a flat.	
198. LEAD DRIERS	A paste drier found in varnish. (see paste drier)	
199. LENS	A disk of optical glass, or a combination of two or more disks, used for controlling light rays from an object.	All cameras have a <u>lens</u> .
200. LIGHT STRIAK	Fog produced on a negative by improper light; such as a reflection, or a hole in the bellows.	
201. LIVE COPY	Any copy suitable for reproduction without using a screen. Copy composed of lines and dots as distinguished from continuous tone copy.	
202. LINSRED OIL	A drying oil used in mixing inks.	
203. LITHOGRAPHY	A method of printing based on the repulsion of grease and water to separate printing from non-printing areas.	
204. LIVERING, INK	A stiffening of ink because of a chemical change.	<u>Ink livering</u> can cause ink to fail to print.
205. LONG INK	A consistency of ink. "Long" if it stretches when tapped between fingers. "Short" if it breaks. (See tack).	
206. MAGENTA CONTACT SCREEN	A contact film screen made of magenta colored dots used for making halftone negatives in the camera.	
207. MAGNESIUM NITRATE	A salt used as a buffer in fountain etches.	
208. MAKE READY	Press preparation made before beginning to print.	
209. MAKELINE	An accurately scaled line showing size to which copy is to be enlarged or reduced.	

<u>TERM</u>	<u>DEFINITION</u>	<u>USE</u>
210. MASKING	Blocking out areas of a sensitive film or plate from exposure.	Golden rod is used for <u>masking</u> negatives.
211. MASSTONE	Color of ink when in a mass.	The <u>masstone</u> was lighter than the printed color.
212. MASTER FILM POSITIVE	A positive made from original negative for the purpose of making additional negatives.	
213. MATTE	A dull surface.	
214. MEALY	Flecked with white or gray. Spotty.	
215. MICROMETER	An instrument used for measuring the thickness of plates, packing, and blankets.	
216. MIDDLETONE	Intermediate tones between highlights and shadows in photographic reproduction.	
217. MOIRE	An imperfect printing caused by overlaying halftones.	
218. MONOCHROME	One color; but with varying shades.	Blue is a <u>monochrome</u> .
219. MOSAIC	A composite map made from aerial photographs.	
220. MULTICOLOR	Two or more colors; sometimes called polychrome.	
221. MULTIPLE BURN	The intentional exposure of two or more negatives in register on the same sensitized surface.	
222. NEGATIVE	A photographic image in which the tones are reversed.	
223. NEUTRALIZE	Counteract acidity or alkalinity.	
224. NITRIC ACID	A counter etch.	
225. NODAL POINT	One of two points in a lens where a light ray emerging from the second point is parallel to the ray arriving at the first point.	
226. OFFSET	1. An indirect printing method in which an inked image is printed on a rubber blanket that in turn prints (or offsets) the inked impression onto a sheet of paper. 2. Wet ink transferred from one sheet to back of another in a pile of freshly printed sheets.	
227. OFFSET PRESS	A three-cylinder press used in offset printing.	
228. OPACITY	The degree that a photographic image will prevent the passage of light.	

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<u>TERM</u>	<u>DEFINITION</u>	<u>USE</u>
229. OPAQUE	Any material that prevents the passage of light; or particular wavelengths.	
230. OPTICAL AXIS	A straight line which passes through the centers of curvature of the lens surfaces.	
231. ORIGINAL NEGATIVE	The negative developed from the film which was in the camera at the instant of exposure.	
232. ORTHOCHROMATIC	Photographic emulsions sensitive to all colors other than red.	
233. OVERPRINT	New information printed on top of the original map.	
234. OXIDATION	Corrosion of plates from slow drying.	
235. PACKING	Paper used under a plate or blanket to adjust the surface contact pressure between the plate and the blanket.	
236. PALLET	A wooden platform used for storage of paper.	
237. PANCHROMATIC	Photographic emulsions sensitive to all visible colors.	
238. PAPER HYGROSCOPE	An instrument for measuring moisture content of a stack of paper.	
239. PARALLAX	The apparent movement of an object when viewed from different positions.	
240. PASTE DRIER	An ink drier made from lead and manganese. Dries ink with a low gloss, hard surface.	
241. PEEL	Selectively removing the opaque layer from its film base.	
242. pH	A term used to express the degree of acidity or alkalinity. A pH of "7" is considered neutral.	A pH of "6" is acidic while "8" is alkaline.
243. PHOTOCOMPOSE	A mechanical process where several images are imposed one at a time on a negative or plate by means of a photocomposing machine.	
244. PHOTOGRAPH	A image formed when a sensitized emulsion is exposed to light rays from an object.	
245. PHOTOGRAPHY	The process of producing images on sensitized surfaces by the actinic action of light.	

<u>TERM</u>	<u>DEFINITION</u>	<u>USE</u>
246. PHOTOLITHOGRAPHY	A lithographic process in which photography is used to produce an image on the printing surface.	
247. PHOTOMAP	A mosaic upon which grid lines, marginal data, contours, place names, boundaries and other cultural data may be added.	
248. PHOTOMAP BACK-UP	A photomap printed on the back of a line map of the same area and at the same scale.	
249. PHOTOMECHANICAL	Any reproduction process in which photography is used in combination with mechanical means to produce a printing surface.	
250. PHOTOMOSAIC	See mosaic.	
251. PICKING	Removal of part of the paper surface during printing when the pulling force of the ink is greater than the surface strength of the paper.	
252. PICTOCHROME PROCESS	The process employed to produce pictomaps.	
253. PICTOMAP	A photomap on which the photographic imagery of a standard mosaic has been converted into interpretable colors and symbols by means of tonal masking techniques.	
254. PIGMENT	Manufactured chemical colors, inorganic or organic. Inorganic pigments are generally opaque; organic pigments are used for lithographic transparent inks.	
255. PILING	Sticking of ink on the plate or blanket instead of transferring to the paper.	
256. PILING BAR	An upright guide to stack paper against.	
257. PINHOLES	Small spots on negatives which show up as spots on the printed image.	<u>Pinholes</u> can be caused by dust on the film during exposure.
258. PITCH DIAMETER	Rolling diameter of a gear. Same as diameter of cylinder bearers.	
259. PLANOGRAPHY	Printing from a flat surface in which the image and non-image areas are in the same plane.	
260. PLATE	A thin metal, plastic, or paper sheet, that carries the printing	

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<u>TERM</u>	<u>DEFINITION</u>	<u>USE</u>
PLATE (cont)	image and whose surface is treated to make only the image areas ink receptive.	
261. PLUCKING	See picking.	
262. PLUGGING	Filling in of shadows.	<u>Plugging</u> is caused by incorrect light angles.
263. POLISH OUT	Removal of an image or unwanted marks from a plate by erasure.	An etch slip is used to <u>polish out</u> marks on plates.
264. POLYMERIZE	Chemical combination of organic compounds.	
265. POSITIVE	A photograph in which image densities are the same as the original.	
266. POTASSIUM BROMIDE	Salt used in photographic developers to inhibit fog.	
267. POTASSIUM FERRICIANIDE	Used in photographic reducers.	
268. PRECISION CAMERA	Any camera capable producing high quality definition.	
269. PRESERVATIVE	A chemical which will prevent a substance from decomposing or changing its composition	
270. PRESS PROOF	An impression taken from among first copies run on the press; used for checking purposes.	
271. PRIMARY COLORS	Three basic colors, any two of which combine to produce a complimentary color.	Red, blue, and green.
272. PRINT	A photographic copy made by projection from a negative.	
273. PRISM	A transparent body, usually glass, bounded in part by two nonparallel plane faces. Used photographically to reverse the image going through the lens.	
274. PROCESS LENS	A lens for photomechanical copying, enlarging, or projection purposes, free from aberrations.	A <u>process lens</u> usually of low aperture and symmetrical construction.
275. PROCESS PHOTOGRAPHY	Line and halftone photography in which the resulting negatives and positives are used in the preparation of plates.	
276. PROGRESSIVE PROOFS	A series of color prints that show the individually separated color printings and their progressive combinations as each color is overprinted.	

<u>TERM</u>	<u>DEFINITION</u>	<u>USE</u>
277. PROOF	A trial print for examination and editing.	
278. PROOFING	The operation of pulling proofs of plates for checking prior to production printing.	
279. PULL	To take an impression.	We <u>pull</u> a printed sheet to check register.
280. PUNCH	To perforate.	
281. RAG STOCK	Paper containing rag pulp.	
282. RATIO PRINT	A print in which the scale is different from the original copy.	
283. REAM	A quantity of paper, usually 500 sheets.	
284. REDUCERS	1. Chemicals used to lower the density of photographic images or halftone dots. 2. Compound used to change consistency of printing ink.	Linseed oil is a <u>reducer</u> .
285. REFRACTION	Bending of light rays at an angle.	
286. REGISTER	Exact positioning of an image.	
287. REGISTER MARKS	Small crosses, guides, or patterns applied to the original copy prior to reproduction and used for positioning.	
288. RELATIVE APERTURE	The ratio of the equivalent focal length to the diameter of the aperture. Also called f number, stop, or speed.	
289. RELIEF	The elevations and typography of a land surface, usually represented by contours.	
290. REPRINT	To print additional impressions from an existing one.	
291. REPRODUCIBLE	Any copy capable of being used to prepare a plate.	
292. REPRODUCTION	The complete process involved in making copies from an original. Also, the product of this process.	
293. RESIDUAL CHEMICALS	A thin film of chemical solution always left on a metal plate after processing.	
294. RESOLUTION	The ability of an entire photographic system to produce a sharply defined image.	
295. RESOLVING POWER	A mathematical expression of lens definition.	The required <u>resolving power</u> of the lens should be 25 lines per millimeter.

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<u>TERM</u>	<u>DEFINITION</u>	<u>USE</u>
296. RESTRAINER	The chemical in developer that slows development and chemical fog.	Potassium bromide is a commonly used <u>restrainer</u> .
297. RETICULATION	Breakup of emulsion because of extreme temperature changes.	
298. RETOUCHING	Correcting a plate, negative, positive, or copy by means of brush, pencil, pen, air brush, etc.	
299. RIGHT-READING	An image when viewed through the base is readable.	
300. ROLLER STREAKS	Streaks in solids caused by uneven contact of the inking rollers.	
301. ROLLING UP	The inking of a finished plate without making a proof. Usually done by hand to protect the image or to inspect the image.	
302. RUN	The number of impression made from a given plate.	
303. SAFELIGHT	A colored source of light to which photographic materials are relatively insensitive.	
304. SAFETY FILM	A film which will not burn readily.	
305. SCALE OF REPRODUCTION	Percent of enlargement or reduction.	
306. SCREEN ANGLE	The angle the rows of halftone dots make with the vertical when right-reading, measured clockwise from 12 o'clock.	
307. SCREENED LINE PLATE	A plate made through a screen, resulting in a screened image instead of a continuous tone image.	
308. SCRIBING	The process of preparing a negative by hand, which can be reproduced by contact exposure.	
309. SCUM	Film of ink accepted by non-image areas of plate.	
310. SENSITIVITY GUIDE	A gray scale exposed on the plate with an image, which when developed, shows the sensitivity of the coating.	A <u>sensitivity guide</u> measures tone variations of an exposed plate.
311. SENSITIZER	The solution used to make photographic surfaces light sensitive.	
312. SET	A group of reproducibles from which a map or chart can be printed.	

<u>TERM</u>	<u>DEFINITION</u>	<u>USE</u>
313. SHARPNESS	A measure of the ability of a negative material to reproduce sharp edges.	
314. SHORT INK	See long ink.	
315. SHORT STOP	An acid used to stop the action of alkaline developers.	
316. SIGNATURE	A single group of folded pages in units of four which form sections of a book for binding.	
317. SILVER BROMIDE	Silver salt used in photographic emulsions.	
318. SILVER CHLORIDE	Silver salt used in paper emulsions.	
319. SILVER PRINT	Photographic print on paper sensitized with silver chloride.	
320. SIZE	To coat with any of various glue materials used for filling the pores in the surface of paper or fiber.	
321. SLIP SHEETS	Sheets of paper manually placed between printed sheets to prevent offsetting of ink; or between negatives to prevent scratches.	
322. SNAKE SLIP	See etch slip.	
323. SODIUM BENZOATE	A preservative for organic material.	
324. SODIUM BICARBONATE	Weak alkali used to assist plate development.	
325. SODIUM CARBONATE	An accelerator for photographic developers.	
326. SODIUM HYDROXIDE	Strong alkali used to remove old images from plates.	
327. SODIUM SULFITE	A preservative for photographic developers.	
328. SODIUM THIOSULFATE	See hypo.	
329. SPECIFIC GRAVITY	Ratio of density of a material to water.	<u>Specific gravity</u> of water is 1.0.
330. SPECTRUM	The band of visible colors formed when a light ray is separated by a prism.	
331. SPEED	The sensitivity of photographic material to light.	
332. SPHERICAL ABERRATION	Lens distortion in which light rays from outer zone of lens and inner zone of lens do not focus.	

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<u>TERM</u>	<u>DEFINITION</u>	<u>USE</u>
333. STABLE BASE	A general term for film bases possessing a high amount of dimensional stability.	
334. STEPOVER	Side-by-side exposure of a flat along the gripper edge.	
335. STEP-UP	Up-and-down exposure of a flat from the gripper edge.	
336. STEREOSCOPIC PLOTTING INSTRUMENT	An instrument used to plot a map by looking at the image formed by a pair of photographs.	
337. STICK-UP	A pre-printed material pasted on maps to eliminate hand lettering.	
338. STRIP FILM	A photographic film in which the emulsion can be transferred to another base for stripping purposes.	
339. STRIPPING	1. The art of producing a flat. 2. The refusal of ink rollers to accept ink, caused by glazing or driers.	
340. SUCKERS	Suction cups which lift and carry paper sheets forward.	
341. SURPRINT	See overprint.	
342. TACK	Stickiness of ink.	
343. TINT	Color gradations used on maps to designate depth or height.	
344. TONE	Each shade variation of color from black to white (see hue).	
345. TRANSLUCENT	A property of material to pass diffused light.	
346. TRANSMISSION	Light-passing ability of a material.	
347. TRANSPARENCY	A photographic print on a clear base. Also light-transmitting capability of a material.	
348. TRAP	Ability of ink on paper to accept later colors.	
349. TRIM MARKS	Lines placed on original copy to serve as guides in cutting or trimming the printed sheets to their final size.	
350. TYPE	That surface which accepts ink and forms the printed impression.	
351. ULTRAVIOLET LIGHT	Wavelengths short of visible spectrum.	

<u>TERM</u>	<u>DEFINITION</u>	<u>USE</u>
352. UNDERCUT	The difference between the radius of the bearers and the radius of the cylinder body; giving a space for the plate or blanket plus a margin for packing adjustment.	
353. UNDERCUTTING	The spread of light beyond the transparent areas of a negative or positive during exposure.	Overall contact eliminates <u>undercutting</u> .
354. VARNISH	Usual vehicle for inks.	<u>Varnish</u> is used to mix ink.
355. VEHICLE	Liquid used to hold pigments together and give ink its working properties.	
356. VIGNETTING	A reduction in density of parts of a photographic image caused by a stopping of some rays from entering lens.	<u>Vignetting</u> is used in the magenta halftone screen.
357. VISCOSITY	Resistance to flow; opposite of fluidity.	
358. WALK OFF	Failure of parts of an image to stick to a plate.	
359. WASH DRAWING	Made by a brush it washes with a single color; usually black, to be reproduced by halftone.	
360. WASHUP	Cleaning rollers or press.	
361. WAVELENGTH	The distance between two crests of an impulse. Lower waves are visible while higher are radio.	
362. WETTING AGENT	Chemicals that aid in mixing of solids with liquids.	
363. WINDING STOCK	Separation of paper stock by jogging to get air between the sheets.	
364. WORK-AND-BACK (SHEETWISE) LAYOUT	The front of a signature is printed with one plate, while the back is printed with another.	
365. WORK-AND-TURN LAYOUT	Two or more signatures are printed front and back by one plate. Plate is turned from side to side.	
366. WORK AND TUMBLE LAYOUT	Press sheets are turned from top to bottom to allow one plate to print both sides.	
367. WRONG READING	An image which when viewed through the film base is a mirror image and not readable.	
368. YIELD VALUE	Measure of rigidity of ink.	

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TECHNICAL MANUAL

OFFSET PHOTOLITHOGRAPHY AND MAP REPRODUCTION

HEADQUARTERS, DEPARTMENT OF THE ARMY

JULY 1970

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TECHNICAL MANUAL

TM 5-245

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C. 21 July 1970

OFFSET PHOTOLITHOGRAPHY AND MAP REPRODUCTION

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This manual supersedes TM 5-245, 12 September 1962.

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NOTE: CHAPTERS 1, 3, 4, 5, 6, 7, 10 HAVE BEEN DELETED. THIS MATERIAL
WAS NOT RELEVANT TO THIS COURSE.

CHAPTER 2

THE PHOTOLITHOGRAPHIC PROCESS

2-1. History

Modern offset photolithography has evolved from stone lithography, the principles of which were discovered in Europe in the late eighteenth century. A man named Alois Senefelder found, when he wrote on a slab of porous limestone with a greasy substance, and then wet the stone with water, that ink would adhere to the greasy image but not to the rest of the stone. He could thus make as many copies as he wished by wetting and re-inking the stone before each impression. The process came to be called "lithography," which means "stone writing," a name which has survived to modern times. Artists and businessmen quickly adopted the new way of printing because it was so much faster, simpler, and cheaper than copperplate engraving, the most widely used method up to that time. The presses which were developed for printing from stone were of the flatbed type,—slow, clumsy, and cumbersome by our standards, but efficient and economical for their times. By the middle of the nineteenth century, the new science of photography brought major changes to the printing industry. An image could be engraved by photographic methods on a thin metal plate, which could then be mounted on a rotary press, a vast improvement over the old flatbed presses. Lithographers soon found that photography could also be used to put a chemically hardened lithographic image on metal plates, making it possible to use rotary presses for what was now called "photolithography." These presses printed the image directly from plate to paper, however, and thus were very limited in the type of paper that could be used, and in the quality of the image. Ira Rubel is generally credited with the invention, in 1905, of the offset method of printing. He noticed that if the paper feeder missed a sheet when the press was running, the image would be transferred instead to the rubber-covered impression cylinder, then printed again on the back of the next sheet. This unintentionally "offset" image was superior in quality to the directly-printed image, and Mr. Rubel made use of this fact in developing a press in which the image

was "offset" from plate to rubber cylinder, and then printed on the paper. All of the complex, high-speed offset lithographic presses of today are refinements of this basic idea.

2-2. Principles of Offset Lithography

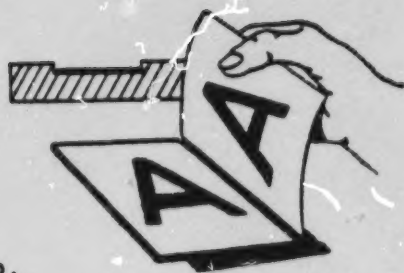
a. *Types of Printing.* There are three principal methods of printing: letterpress, intaglio, and lithography. Almost all modern printing may be classified as one of these three types. In the letterpress method, the image area is raised above the surface of the printing image carrier, and therefore is the only part of the surface area which takes the ink and prints. In the intaglio method, the opposite is true. The image is cut below the surface of the plate, and when ink is applied to the plate and wiped off the surface, it remains in the engraved or sunken image areas, and is transferred to the paper. Lithography differs from both of these methods in that the image is neither raised above nor cut below the surface of the plate, but lies in the same plane as the nonprinting areas. The lithographic plate has been chemically treated so that only the image areas attract the ink, and the nonprinting areas remain clean. Figure 2-1 illustrates the differences between the three methods of printing.

b. *Photolithographic Principles.* All lithography, from the earliest days of printing from stones to the latest high-speed presses, is based on the simple fact that oil and water do not mix. The image carrier is moistened so that the greasy ink will adhere only to the image. This principle is applied in the modern plate-making process and during the operation of the press as follows:

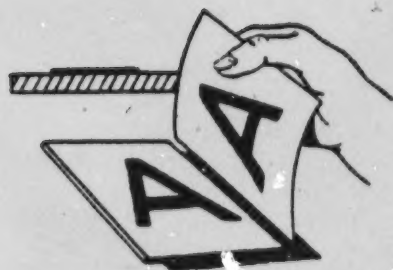
(1) A sensitized metal sheet, usually aluminum, is exposed photomechanically to a negative containing the desired image. Wherever light penetrates the negative to the plate, the sensitized surface of the plate is hardened. In the developing process, these light-hardened image areas are retained, while the coating in the unexposed nonprinting areas is washed away. The image areas attract the greasy ink and repel water, while the



a.



b.



c.

Figure 2-1. The three main printing processes.

- a. Letterpress.
- b. Intaglio.
- c. Lithography.

nonprinting areas become water-receptive and ink repellent (fig. 2-2).

(2) The exposed and developed plate is mounted on a press which has both a dampening and inking assembly. As the plate cylinder rotates, it is first dampened with the water solution to make the nonprinting areas ink-repellent. The ink is then applied, adhering only to the image areas, thus making it possible to print only those areas on the final copy.

(3) In offset printing, the image is not printed directly from plate to paper, but instead is



Figure 2-2. Photolithographic plate-making.

transferred first to a rubber blanket mounted on a cylinder, and then to the paper. This "offset" feature gives the lithographic press its great versatility. A greater variety of papers can be successfully used because of the resilience of the rubber blanket, making it possible to print on coarse as well as smooth stock. Because excessive amounts of either water or ink on the plate do not reach the paper, finer detail can be reproduced, and the paper does not so readily lose its size, making close registration between colors possible. On offset presses, the image on the plate is positive, or "right-reading," because it must be reversed on the blanket before it is printed, again in right-reading form, on the paper. This important feature is illustrated in the simplified diagram shown in figure 2-3.

2-3. Military Uses of Lithographic Printing

a. Offset photolithography in the armed forces is probably used most extensively for the reproduction of military maps. The high speed and long runs of the presses, coupled with the fine quality

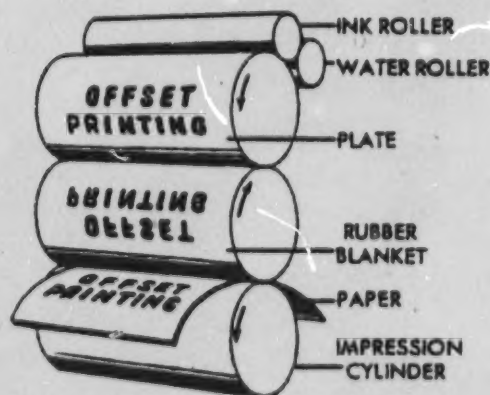


Figure 2-3. Offset principle.

of the printed product, make them ideal for meeting military mapping needs. Topographic reproduction units use this type of press for the reproduction of monochrome and multicolor topo-

graphic maps, photomaps, trig lists, and other printed items related to military mapping. The part played by the reproduction unit in the map production effort is indicated in figure 2-4.

THE MAPPING CYCLE

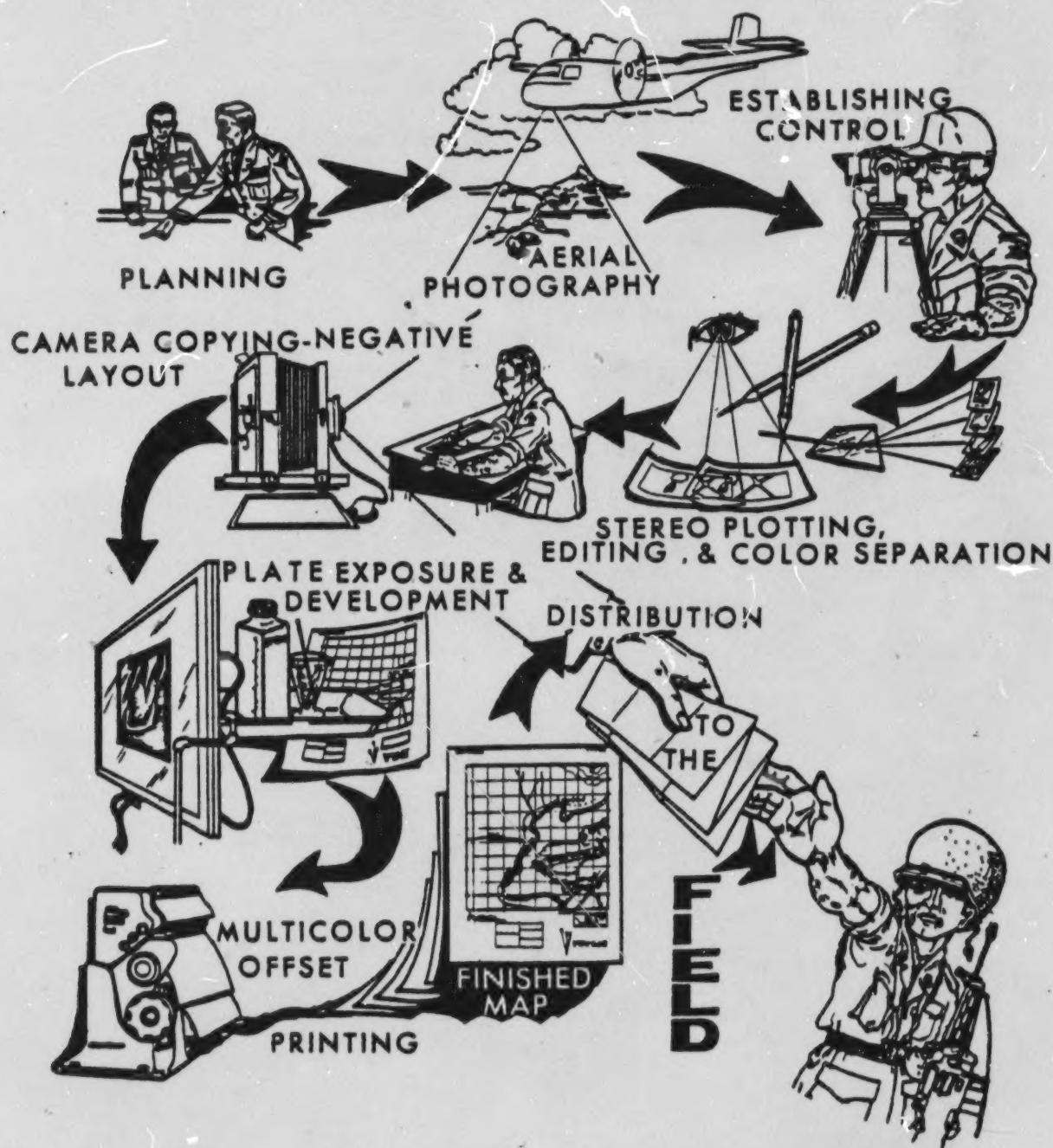


Figure 2-4. Mapping cycle.

b. Other military printers use offset lithography whenever the printing effort requires volume reproduction, relatively low cost, speed and quality. Printing plants in the armed services print such diverse products as books, forms, leaflets, and posters, ranging in use from classroom texts to psychological warfare material.

c. The chapters in this manual emphasize the various phases of the photolithographic process in the reproduction of maps and related topographic products. Factors affecting other military uses of lithographic printing which differ basically from map reproduction are also discussed in the appropriate chapters.

2-4. Phases in the Photolithographic Process

a. *Map Reproduction.* There are five basic phases in reproducing a map by the photolithographic process. These include production planning, copying the original material photographically with the process camera, making negative corrections and layouts, making the plates, and printing the map on the offset press.

(1) Production planning consists of studying the production request, reviewing the materials received for adequacy, scheduling production personnel, ordering supplies, and preparing the necessary work orders. Since the specifications for cartographic compilation and color separation are so detailed and exacting, and the format for each standard series is so well established, there is little or no copy preparation necessary on the part of map reproduction personnel before the camera phase. Planning operations are discussed in chapter 3; copy preparation is discussed in chapter 4.

(2) Photographing the map copy involves mounting a light-sensitive film in the back of a process camera, mounting the copy on the copy-board of the camera, exposing the film to the image on the copy by means of the action of light through the camera lens, and developing a usable negative. The process photography phase of the photolithographic operation is treated in detail in chapter 5.

(3) In the negative correction and layout stage, the negatives are examined for defects, and pinholes and any extraneous images are opaqued. If corrections to the image are necessary, they are either engraved on the negative, or stripped in with a set-in and taped portion of negative containing the corrected images. Layout consists of assembling and positioning the negatives in the desired location on a support flat. This assembly

will be used to make the printing plate. In map reproduction on the smaller field presses, only one negative image, rather than an assembly, is positioned on each flat, but if the map is multicolor, this positioning is critical, since the registration of the various colors to each other depends on its accuracy. Chapter 6 contains a detailed discussion of layout procedures.

(4) In the platemaking phase of the photolithographic process, the image is transferred from the negative flat to the press plate. The sensitized plate is mounted in a vacuum frame with the masked copy negative placed over it, and is exposed to light. The latent image on the plate is then developed. The developer fixes the exposed, ink-receptive image on the plate and removes the nonprinting portions, exposing the water-receptive surface of the metallic plate. The plate is then ready for the press. Platemaking procedures are described in chapter 7.

(5) Offset printing on a modern lithographic press is an automatic machine operation. The pressman, however, must first make all necessary adjustments to the ink and fountain assemblies, the plate, blanket and impression cylinders, and the feeder and delivery assemblies to assure smooth and proper operation of the press and printed images of acceptable quality. Reproduction of a multicolor map on a single color press requires that the plate be changed, the press cleaned and reinked, and the paper rehandled for each color, and that the registration between colors meet exacting tolerances. Information regarding the operation of offset lithographic presses is given in chapter 8.

b. *Reproduction of Copy Other Than Maps.* Similar procedures are followed for the photolithography of nonmapping material, with certain modifications and additional phases as required by the nature of the printing job. All good lithography depends upon careful and thorough planning, but non-map material may require considerable copy preparation on the part of lithographic personnel. If it is received in a very rough form, it may require type selection, setting, and proofing, finishing of art work furnished as sketches, and arrangement of art and type into a pleasing design. The process cameraman, in addition to making negatives suitable for platemaking, may also be called upon to color separate copy photographically by the use of filters, or to alter the size or the nature of the copy by photo techniques. Layout for non-map work usually is more complex, especially in the preparation of book pages or folded pam-

phlets. Plate-making and press operations are similar for all kinds of lithography, but finishing operations vary considerably. Maps usually are

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packaged flat for distribution, but other copy may require cutting, folding, hole punching, binding, stapling, or other treatment.

CHAPTER 8

OFFSET PRESSES AND OFFSET PRINTING

Section I. INTRODUCTION

8-1. General

a. Offset photolithography is based on the combined talents of many people: camera and film makers, photographers, artists, chemists, plate-makers, press manufacturers and pressmen. But the heart of the process, which actually produces the printed lithograph, and for which the other phases are preparatory, is the offset press and its operation.

b. There are many kinds and sizes of presses, and those that are available to each printing plant determine the nature of the preceding phases which prepare material for printing. Presses are categorized by size, model, and maker; as single or multicolor; as rolled-fed or sheet-fed; and by whether they print on one or both sides of the paper in a single press run.

c. The presses used by military printing plants, while they vary in size, model, and maker, are almost all of the single-color, sheet-fed type, printing on one side of the paper. The ATF Model DP (also called the Chief 29) is the standard offset press in Army topographic units, and is the one used in the mobile vans (fig. 8-1). It can accommodate a maximum paper size of 22½ by 37 inches, and a minimum paper size of 11 by 17 inches. The Harris LUD (fig. 8-2) which is used in some printing plants, has a maximum paper size of 23 by 30 inches, and a minimum paper size of 9 by 12 inches.

d. Other offset presses, the much larger Harris-Seybold Model 145A LUD Offset Press, which handles a sheet size of 35 by 45 inches, and the Model 149 LUN, are not covered in this manual. These presses are used only in base topographic reproduction units. There is usually one of these units in each theater of operations.

e. The general principles governing the operation of offset lithographic presses are illustrated in this chapter by specific references to the ATF Model DP press. Although the principles remain the same, the details of operation and maintenance

of other presses may differ somewhat from those described in the following paragraphs. In all cases, the press operator should refer to the operation and maintenance manuals or the manufacturer's instructions for each particular make and model of press he will use, and should be thoroughly familiar with the location and function of the controls and safety devices on each model.

8-2. Safety

Since the presses contain many exposed moving parts such as rollers, gears, chains, and sprockets, great care must be exercised during operation to prevent serious accidents. The following safety regulations should be adhered to at all times.

a. Fatigue jackets or shirts, if worn, shall be worn inside the trousers with sleeves rolled up above the elbows.

b. Remove all rings and jewelry from the hands and any dog tags or necklaces from the neck.

c. Keep tools, rags, chemicals, and solvents in the spaces provided in a neat and orderly fashion.

d. Never use rags or sponges on a running press.

e. Make no adjustments on a running press.

f. Deposit all wastepaper and rags in their proper receptacles.

g. Keep the floor absolutely clean at all times. Use a solvent to clean floors. DO NOT WAX.

h. Safety controls must be on SAFE when the press is not running, and when making adjustments within the press. They must be taken off SAFE by the same person who put them on.

i. Do not allow plate etch or gum arabic to remain in contact with the skin for prolonged periods of time.

j. Wipe up all spilled liquids immediately.

k. Read and obey all safety regulations within the pressroom.

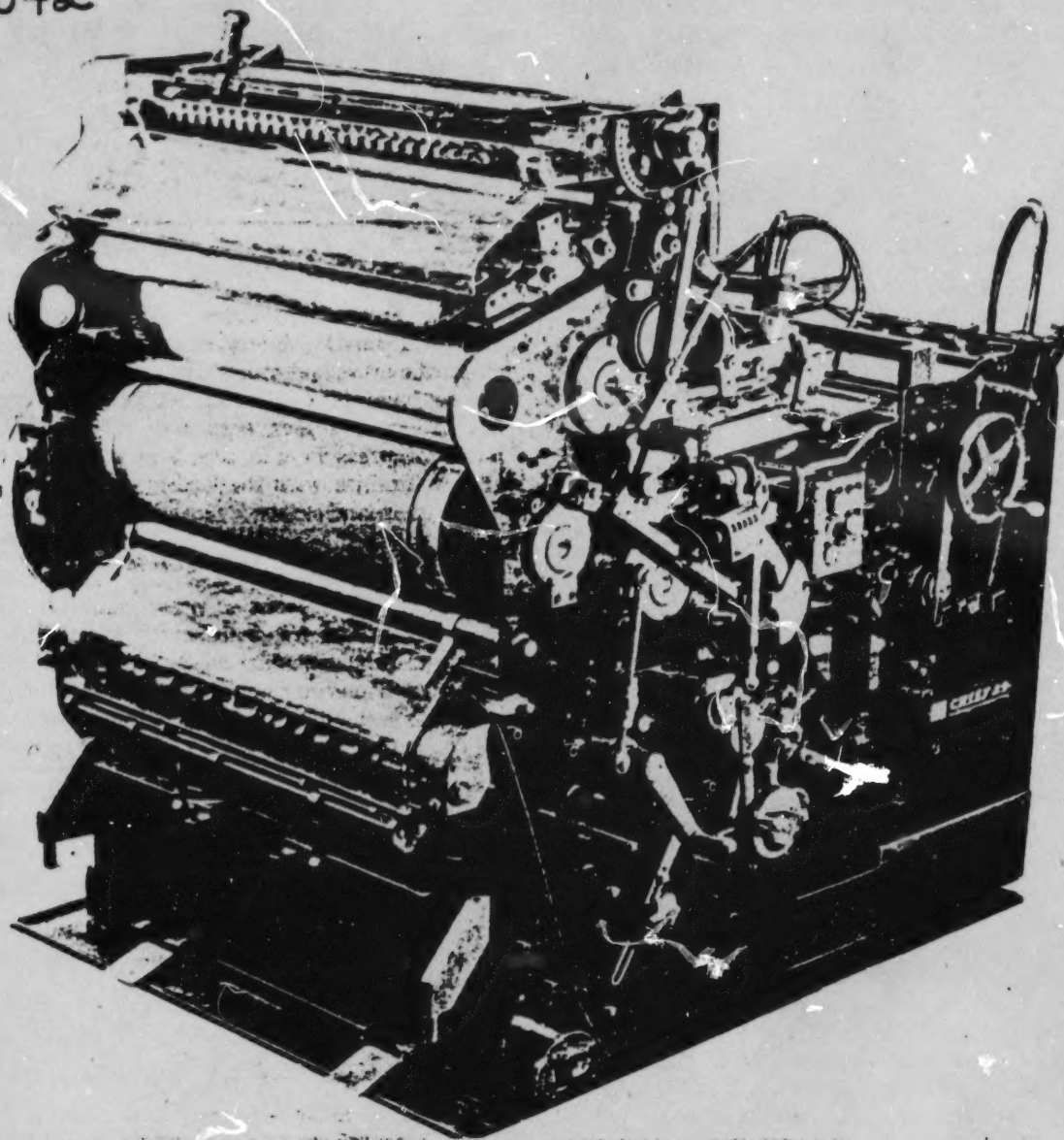


Figure 8-1. ATF Model DP (Chief 29) viewed from the operator's side and showing delivery end.

8-3. Lubrication

An offset press needs periodic lubrication to prevent excessive wear on the parts. Some parts are lubricated with oil, others with grease or gear compound. It is necessary that oiling be done each day, because oil drains from the bearings and other parts if the press stands idle overnight. When any part of the press is lubricated, the press is stopped and the safe switches turned to the SAFE position. The operator should remain con-

stantly alert and safety conscious while lubricating the press. Lubrication instructions for the AFT Model DP Press are contained in Lubrication Orders LO 5-6021-1 and LO 5-6021-2. Lubrication instructions for other model presses are contained in the pertinent manufacturer's maintenance manual.

8-4. Offset Press Terminology

Before any operations are attempted, it is impor-

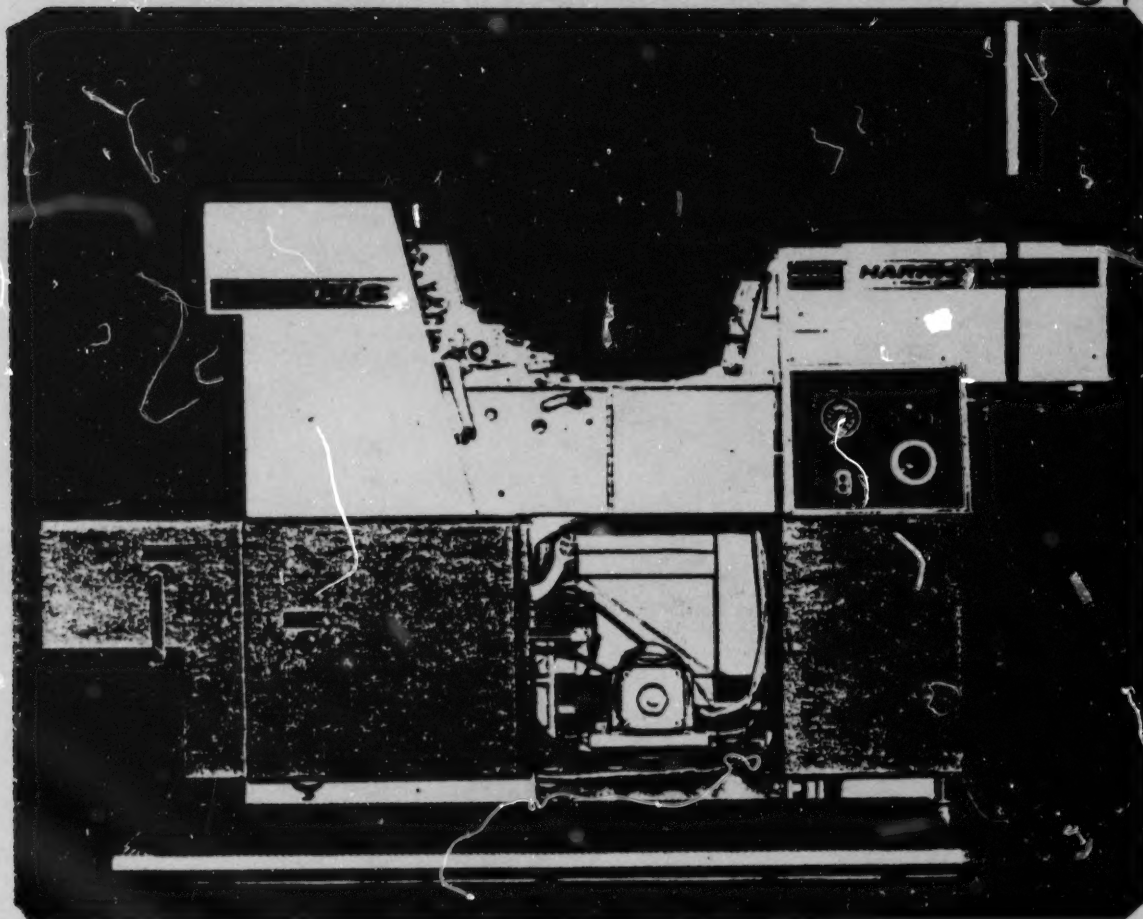


Figure 8-2. Harris LKG Press.

fant to learn and understand the basic terminology which identifies the parts of the press and the assemblies which are necessary to each part of the printing cycle.

a. Figure 8-3 illustrates the basic terms used to locate oneself with relation to the press:

(1) *Feeder end*—where the paper is fed into the press.

(2) *Delivery end*—where the finished printed sheets of paper are stacked by the press. The pressman usually stands here while the press is running.

(3) *Operator's side*—where the controls to operate the press are located. These controls are to the right of the pressman when he is at the delivery end of the press.

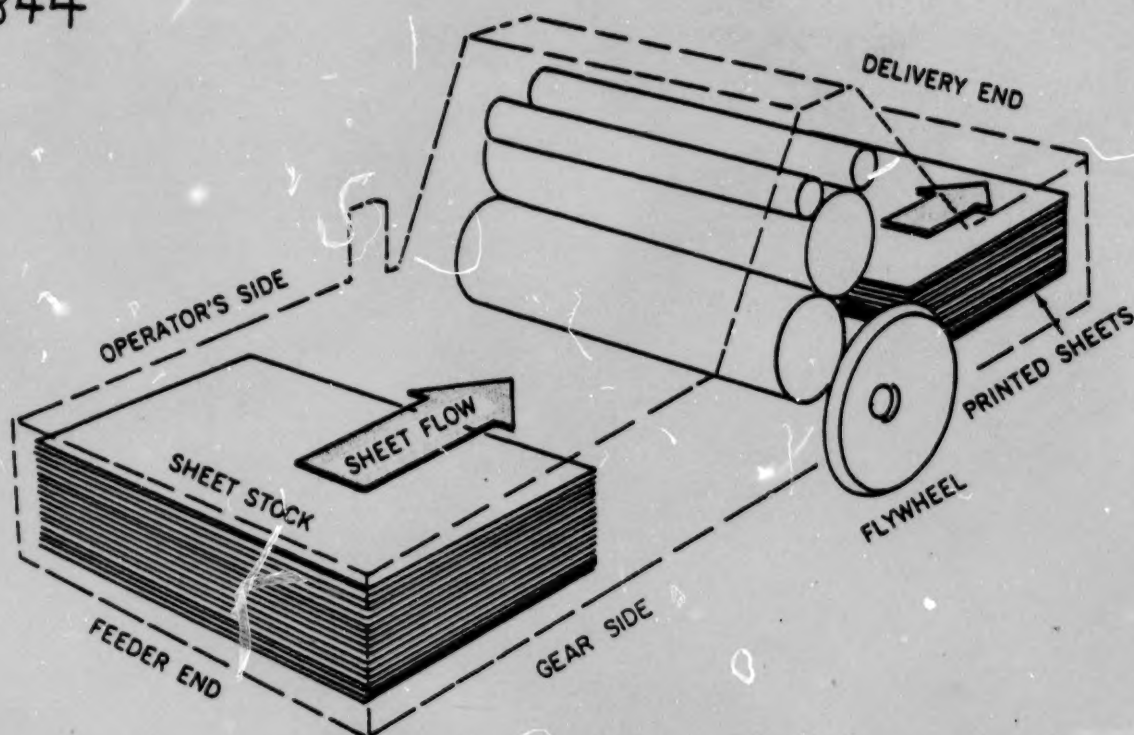
(4) *Gear, or flywheel side*—where the gears necessary for the operation of the press are located.

These gears are to the left of the pressman when he is at the delivery end of the press.

b. The operation of the offset lithographic press may be divided into two basic cycles, the printing or image cycle, in which the image is transferred from the plate to the blanket cylinder, and the paper cycle, in which the paper is moved from the feeder pile, through the press to receive the image from the blanket cylinder, and is then stacked at the delivery end of the press (fig. 8-4). The major parts and assemblies which accomplish these cycles are as follows:

(1) *Printing cycle:*

(a) *Dampening assembly.* The dampening system maintains a supply of dampening solution, usually water with various chemicals added, to keep the nonprinting area of the plate wet. This repels the ink. The dampening assembly must be



WHEN MAKING ANY REFERENCES TO THE SIDES AND ENDS OF THE PRESS USE THESE TERMS ONLY.

Figure 8-3. Orientation terminology.

put against the plate before the inking assembly to keep the plate clean.

(b) *Inking assembly.* The purpose of the inking system is to take the ink from the fountain and move it through a roller system and deposit the ink in a thin, even film onto the image of the plate. The rollers break up the ink particles and spread the ink out in the necessary thin film required for printing.

(c) *Plate cylinder.* This cylinder, on which the plate is mounted, is the top cylinder. When the press is in operation, the plate cylinder is in contact with the dampening assembly, the inking assembly and the blanket cylinder.

(d) *Blanket cylinder.* The blanket cylinder receives the ink image, in reverse, from the plate and transfers it to the paper carried by the impression cylinder.

(2) Paper cycle.

(a) *Feeder board assembly.* This assembly separates the sheets of paper and moves them, one by one, down the feed board or conveyor to the impression cylinder.

(b) *Impression cylinder.* The impression cylinder is the bottom cylinder and is in contact with the blanket cylinder during the printing cycle. This cylinder is adjustable for pressure against the blanket cylinder. The paper is held on this cylinder to receive the image from the blanket cylinder.

(c) *Skeleton cylinder.* The skeleton cylinder drives the feeder and dampening assemblies; it also guides the printed sheet from the transfer point to the delivery board.

(d) *Delivery pile assembly.* This assembly receives and stacks the completed printed sheets.

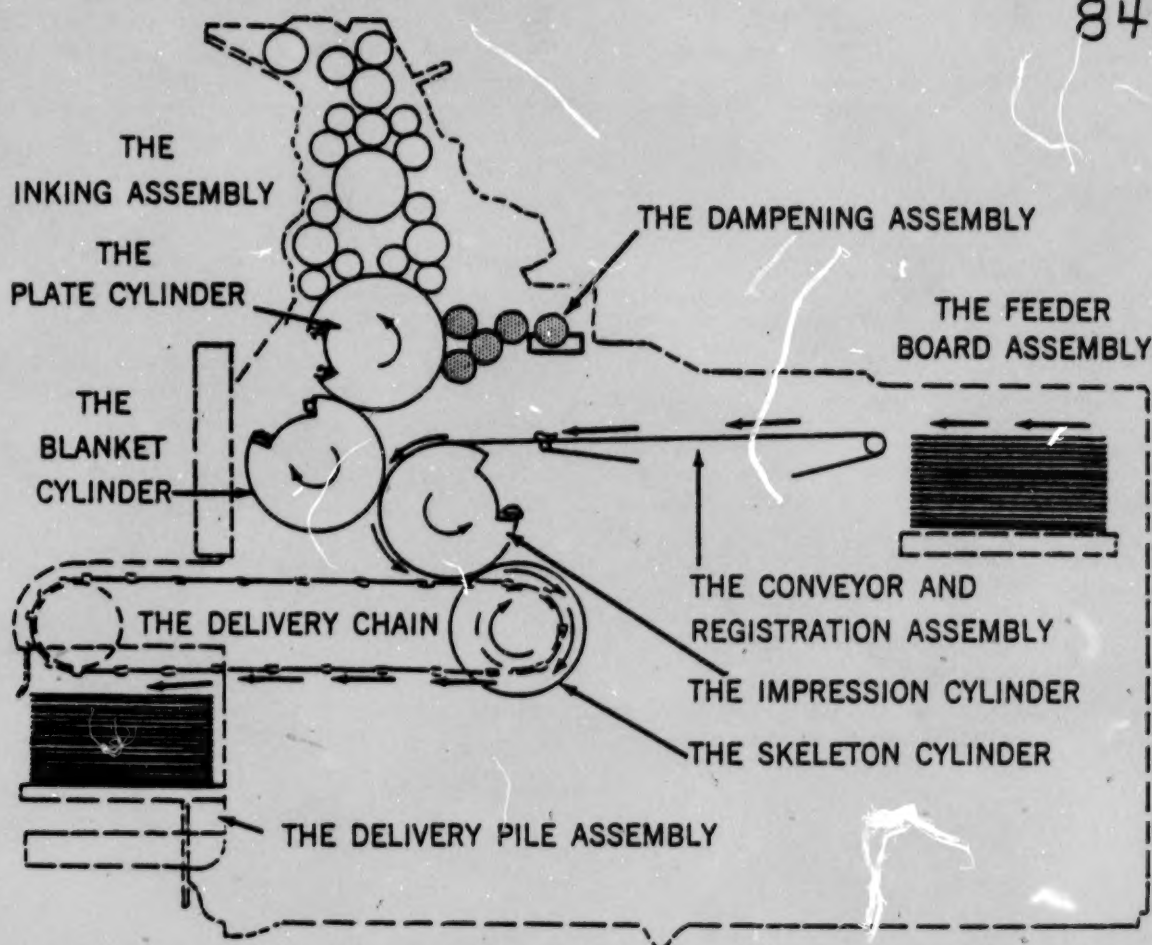


Figure 8-4. A schematic diagram of a typical offset press.

Section II. CONTROLS

8-5. Introduction

The controls system consists of a series of buttons or similar manual or automatic controls used to start, run, vary the speed of, and stop the press. The buttons are set in control boxes or panels located on the press where they can be reached conveniently by the operator. For the location of the controls on the ATF Model DP press, see figure 8-5.

8-6. Nomenclature Relating to Control of the Press

The following tabulated list describes the parts which provide the controls for the ATF Model DP press, and their specific functions (figs. 8-5 and 8-6). Controls on other presses may vary somewhat in location and appearance, but in general, will have similar functions.

Part	Function
Stop button	Used to stop the press. After the stop button is pushed, the press will continue to turn, making three to six revolutions before coming to a complete halt.
Jog, safe, run button. Start button.	If the arrow on the button is pointing to the jog position, the press can be jogged or inched by pressing the start button located immediately below the jog, safe, run button. If the arrow is pointing to "safe", all power to the press is disconnected. If the arrow is pointing to "run" and the start button is pushed, the press will begin running continuously.

Part	Function
Blower buttons -----	Used to start and stop the air pump motor.
Variable speed control	Used to adjust the speed of the press mechanically.
Press reset button (or starter).	Used to reestablish power after an overload has cut the power of the press.
Blower reset button ---	Used to reestablish power after an overload has cut the power of the blower.

8-7. Operational Instructions

a. Starting Press.

(1) Before touching the jog, or inch, button, examine the press to make sure that there are no loose tools or parts in or on the press which could become caught in the mechanism. Turn the plate cylinder over by hand, using the press flywheel.

(2) Assume that the power is on, if the press is properly connected to the power source, and that the press was turned off by the previous user with the mechanical variable speed control set at the slowest operational setting. See that the deliv-

ery station control panel is not set at "safe". Turn the *jog, safe, run* button to "Jog" and press the start button to move the plate cylinder an inch or two. Continue this for two full revolutions of the cylinder.

(3) Turn the *jog, safe, run* button to "run" and press the start button. Start and stop the press several times to get the feel of the control buttons and to observe how quickly the press comes to a complete stop. Try all control stations to see that they are working.

b. *Speed Controls.* The mechanical variable speed control used on the ATF Model DP, illustrated in figure 8-5, is a pulley arrangement which mechanically changes the diameter of the pulley wheel. *This control can be changed only while the press is running.* It is located on the gear side of the press. The adjustment is made by simply turning the handwheel in one direction or the other. Graduated marks on the wheel indicate the number of impressions per hour (minimum 2,500 IPH, maximum 5,000 IPH). The press should never be stopped or started with the mechanical variable speed control set higher than 3,500 IPH.

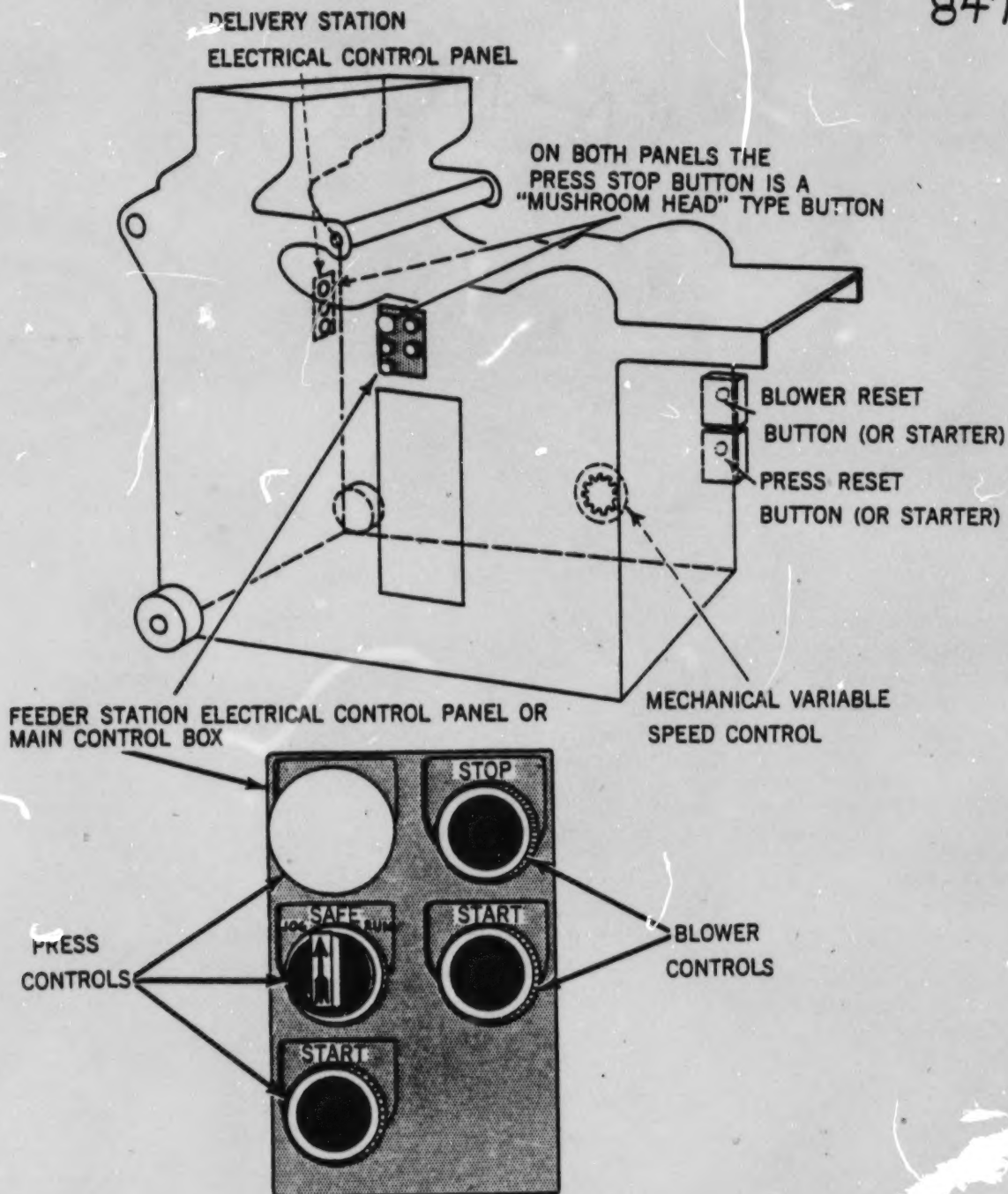


Figure 53. Location of controls on ATF Chief 29.

Figure 8-5. Location of controls on ATF Model DP.

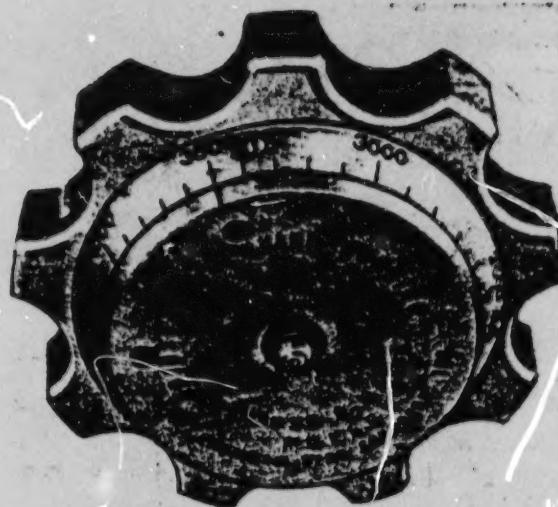


Figure 8-8. Mechanical variable speed control.

Section III. FEEDER ASSEMBLY

8-8. Introduction

The feeder assembly on an offset press is that part of the paper-handling cycle which separates each sheet of paper, positions it, and passes it into the printing cycle. The feeder assembly consists of two subassemblies. The first is the feeder board with its related sheet handling devices, such as the air blast mechanism (fig. 8-7), which "floats" the top few sheets up from the rest of the pile of paper stock, and the sucker mechanism (fig. 8-8), which picks up the top sheet and moves it forward. The second subassembly is centered about the conveyor board with its related sheet-transporting equipment and sheet-positioning or registering guides, such as illustrated in figure 8-9.

8-9. Nomenclature for Feeder Assembly

Part	Function
Feeder board -----	Holds the paper stock to be run through the press. The feeder board rises automatically and allows the sheets to be fed into the press continuously. It may also be raised or lowered manually to permit loading of paper stock (fig. 8-7).
Feeder board elevating handwheel.	Used to raise or lower the feeder board manually (fig. 8-10).
L-shaped pile guide bars.	Used, along with the front pile guide bars and the corner brackets, to hold the stock in a neat pile for feeding (fig. 8-7).

Part	Function
Front pile guide bars -	Used, along with the L-shaped pile guide bars and the corner brackets, to hold the stock in a neat pile for feeding (fig. 8-7).
Sheet separators -----	Steel spring fingers located on the inside edge of the front pile guide bars. They help to prevent more than one sheet from feeding into the press at a time (fig. 8-7).
Pile height governor --	Regulates the height of the top of the pile as it is rising automatically (fig. 8-11).
Corner brackets -----	Used, along with the tail weights, to hold the stock against the pile guide bars (fig. 8-11).
Tail weights -----	Used, along with the corner brackets, to hold the stock against the pile guide bars. They keep the sheets from floating back when the airblast is turned on (fig. 8-11).
Air pump -----	Used to provide both airblast and suction to enable the airblast mechanism and the suction mechanism to function (not illustrated).
Air blast adjustment knobs.	Used to increase or decrease both the overall airblast (large knob) and the airblast at the individual nozzles (smaller knobs) (fig. 8-12).
Air blast nozzles -----	Used to "float" the top few sheets up from the rest of the

Part	Function
Wale floating side nozzles.	sheet pile so that the suckers can grasp the top sheet and move it forward (fig. 8-7).
Suckers -----	A patented type of "floating" nozzle which adjusts itself automatically to the top of the pile (fig. 8-7).
Sucker bar -----	Used to pick up the top sheet and carry it forward to the point where the pull-in wheels and conveyor tapes carry it forward (fig. 8-8).
Air suction lever feeder valve.	The mounting for the suckers, located at the front edge of the sheet pile (fig. 8-8).
Suction control -----	Must be closed, with air pump turned on, for the suckers to function (fig. 8-13).
Conveyor tapes -----	Used to vary the amount of suction (fig. 8-14).
Pull-in wheels -----	Used to carry the sheets down the conveyor board to the front guides (fig. 8-15).
Two-sheet choke or caliper.	Used to grasp the sheet when it is released by the suckers and move it forward onto the conveyor board (fig. 8-15).
Sheet flattener bar, or drop bar.	Prevents two sheets from going down the conveyor board simultaneously (fig. 8-15).
Front guide bar or head stop shaft.	Used to keep the sheet from buckling while being pushed by the side guide (fig. 8-9).
Gripper edge sheet guides or head stop shaft sheet guides.	Used to hold and position the front guides (or head stops) and the head stop shaft sheet guides (fig. 8-9).
Front guides or head stops.	Used to hold down the front edge of the sheet to insure that no grippers fail to grip the sheet (fig. 8-9).
Under tongues -----	Used to stop the sheet and position it before it is transferred to the impression cylinder (fig. 8-9).
Gripper (on impression cylinder).	Used in conjunction with the front guides to support the sheet and keep it from slipping under the guides (not illustrated).
Side guides -----	Used to carry the sheets past the printing pressure point and then release them to the delivery assembly (fig. 8-9).
Sheet guards -----	Used to insure that every sheet is printed in exactly the same lateral position (fig. 8-9).
	Used to keep the sheets flat as they travel down the conveyor board and to prevent them from jamming against the side guide or the sheet flattener bar (fig. 8-9).

Part	Function
Register wheels -----	Used to prevent the sheets from bouncing back from the front guides (fig. 8-16).
Rider balls -----	Used to help maintain registration (fig. 8-16).
Brushes -----	Used to help maintain registration (not illustrated).

8-10. Operational Instructions

a. Loading Feeder Board.

(1) *Creasing first sheet.* When preparing to load paper stock on the feeder board, take a single sheet of the stock to be run and fold it exactly in half with the crease running along the short dimensions of the sheet. Note that the top of the feeder board has three small etched lines—a center line and left and right lines $\frac{1}{8}$ inch apart—extending in from the edge of the board closest to the press mechanism. Place the creased sheet on the feeder board with the center crease $\frac{1}{8}$ inch off the center of the feeder board. Whether the crease in the sheet is aligned with the left line or the right depends on which side guide is to be used to align the sheet laterally just before it receives its impression. If the side guide on the operator's side of the press is to be used, which is the normal procedure when printing maps on one side of a sheet only, align the crease in the sheet with the etched line on the operator's side of the center line.

(2) *Setting forward pile guides.* After positioning the folded sheet on the feeder board, bring in flush against the sheet the L-shaped pile guide bar on the side guide side (fig. 8-7). Bring the other L-shaped bar in and set it approximately $\frac{1}{8}$ inch from the edge of the sheet on the opposite side. The front pile guide bars normally need not be moved. They merely help keep the front edges of the sheets aligned. Take care that the corner pile guide bars are not set too tight against the pile for they will bind the sheets, causing poor feeding and registration troubles.

(3) *Winding and jogging stock.* Stock that is to be placed on the feeder board must be winded and jogged. This consists of first, fanning the stock so that air can enter between the sheets, permitting the top sheet to separate easily from the pile; and second, straightening the pile so that each sheet will be carried down the conveyor board over the same path, helping to insure accurate register. The stock is best handled in lifts of about 100 sheets. The corners of the stock may be

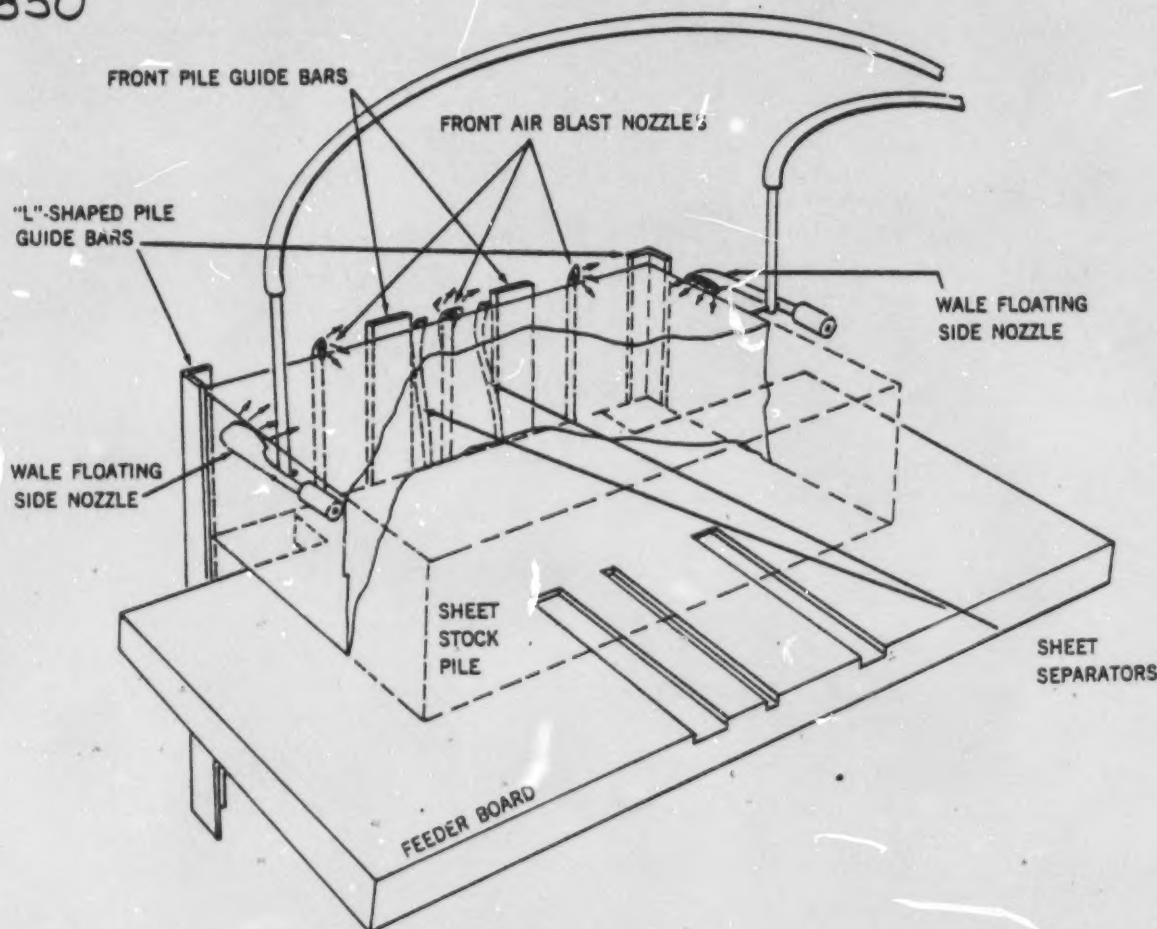


Figure 9-7. Air blast nozzles, front pile guide bars, and sheet separators.

raised and ruffled, and the paper worked back and forth in such a manner as to permit air to enter between, and separate each sheet. It is easy to tell when a sufficient amount of air is between the sheets because the paper will then slide back and forth very easily. After winding, the sheets are bounced against a flat surface so that the edges are flush with each other. If the sheets are not jogged carefully, they do not feed into the press properly, and poor feeding and misregister result.

(4) *Loading feeder board.* With jogging completed, place the lift of stock on the feeder board without disturbing the stock below it. Do not pull back the lift of sheets and jog them forward against the pile guide bars unless all the pile is so jogged at the same time.

(5) *Setting pile height governor.* Set the pile height governor next. This is very important because if the pile is too low, the sheets will not be picked up by the suckers. If the pile is too high,

the suckers may pick up two or more sheets simultaneously. Place the pile height governor about 2 inches from the rear edge of the pile. To set the pile height governor, bring the suckers to their lowest position by turning the press flywheel by hand. Then raise the pile by turning the feeder board handwheel (fig. 8-10) until the top of the pile is about $\frac{1}{4}$ inch below the sucker feet. Then, using the flywheel, turn the press until the pile height governor moves to its lowest position. Next, adjust the pile height governor upward or downward until the bottom of the governor just touches the top of the pile. At this point, start the press (only after making certain that it is clear) and check to see that the feeder board does not attempt to rise any more. An additional check can be made by lowering the pile manually and starting the press to see if the pile rises to the desired height by itself. Once the pile height governor is set, it need not be set again unless feeding prob-

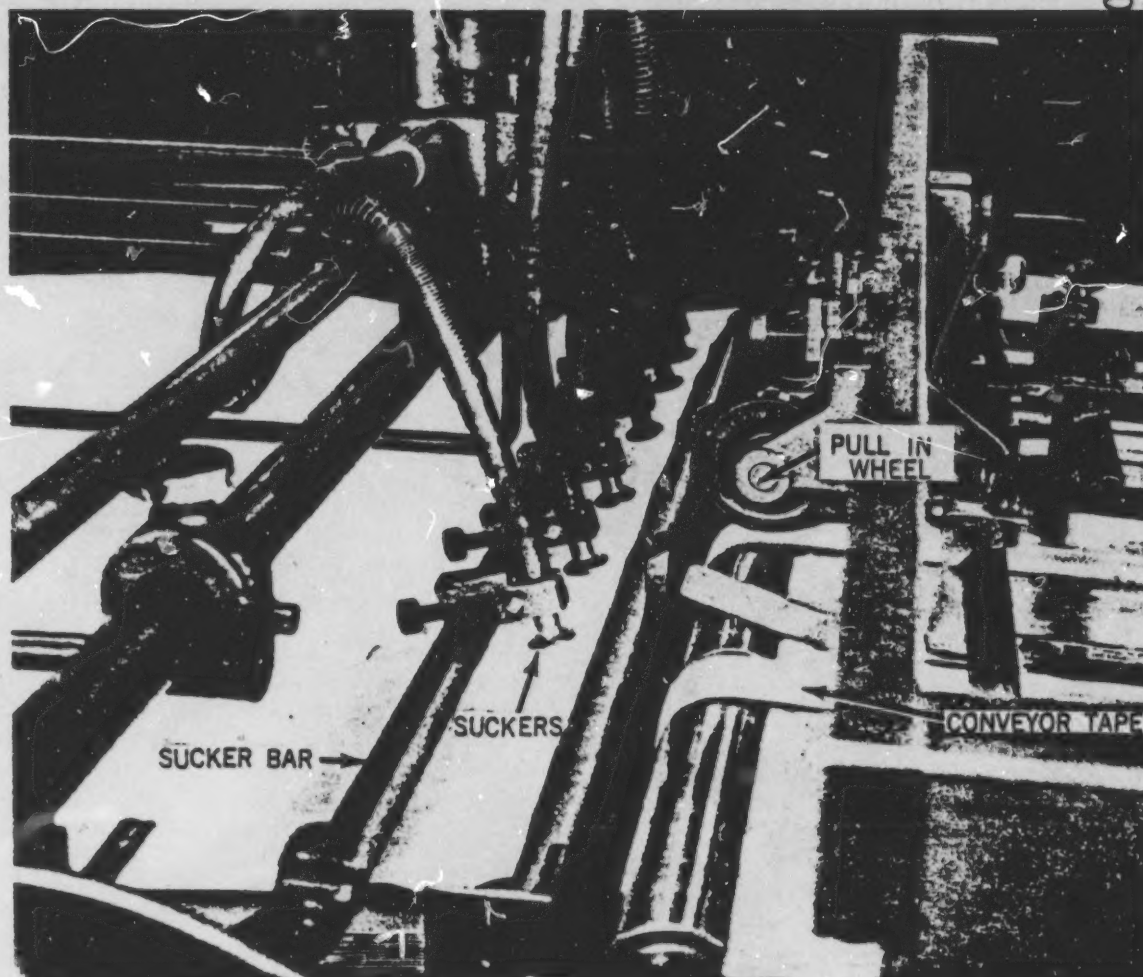


Figure 8-8. Sucker action.

lems are encountered. Tighten the knurled screw and locking nuts in order to retain the desired setting. When feeder troubles occur, check the pile height governor first.

(6) *Setting rear pile guides* (fig. 8-11). Complete the loading of the feeder board by setting the corner brackets and tail weights. These push the entire pile lightly forward against the front pile guide bars. Do not set the corner brackets and tail weights too tight because they will bind the sheets, causing feeder troubles.

b. Adjusting Air Blast and Suction Mechanism. (The procedure varies slightly among different models of presses.)

(1) *Adjusting air blast mechanism.* Locate the air pump, the controls for the air pump and the air blast adjustment knobs or knurled screws.

The knobs on the ATF Model DP (fig. 8-12) operate in the following manner: one complete revolution brings the adjustment back to the same place. There are one large and three small knobs. The large knob controls the overall amount of air blast, one of the small knobs controls the side air nozzle, and the other two small knobs control the three front air nozzles. All the air blast nozzles are adjustable for height and lateral positioning. Adjust the nozzles for the width and length of the pile to be run through the press. See that all locknuts are tightened after making the necessary adjustments.

(2) *Adjusting suction mechanism.*

(a) Space the suckers across the sucker bar to conform to the size of the stock to be run. Exercise care when positioning the suckers so that they do not contact other parts of the feeder mechanism.

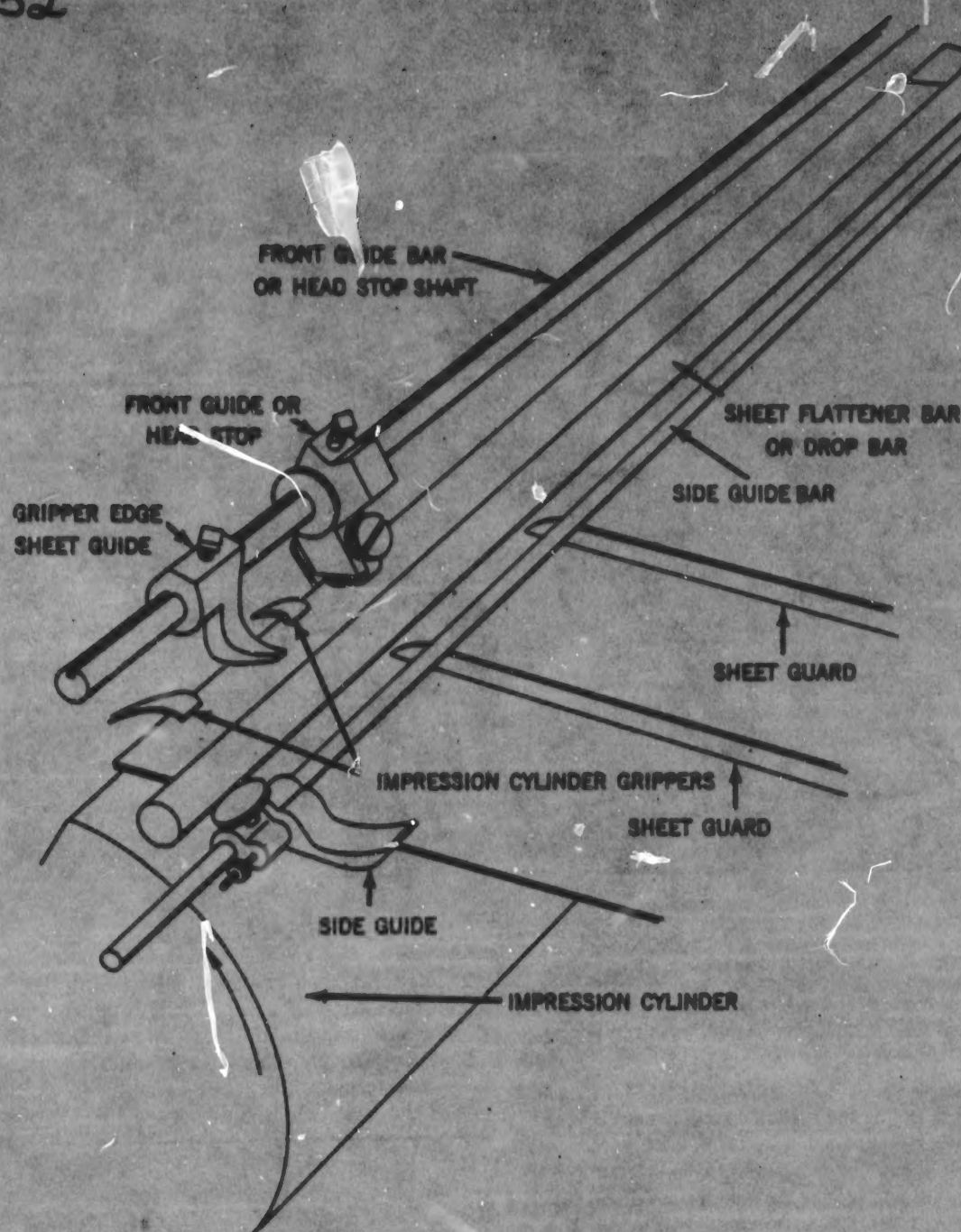


Figure 2-9. Sheet guides and other sheet registering devices.

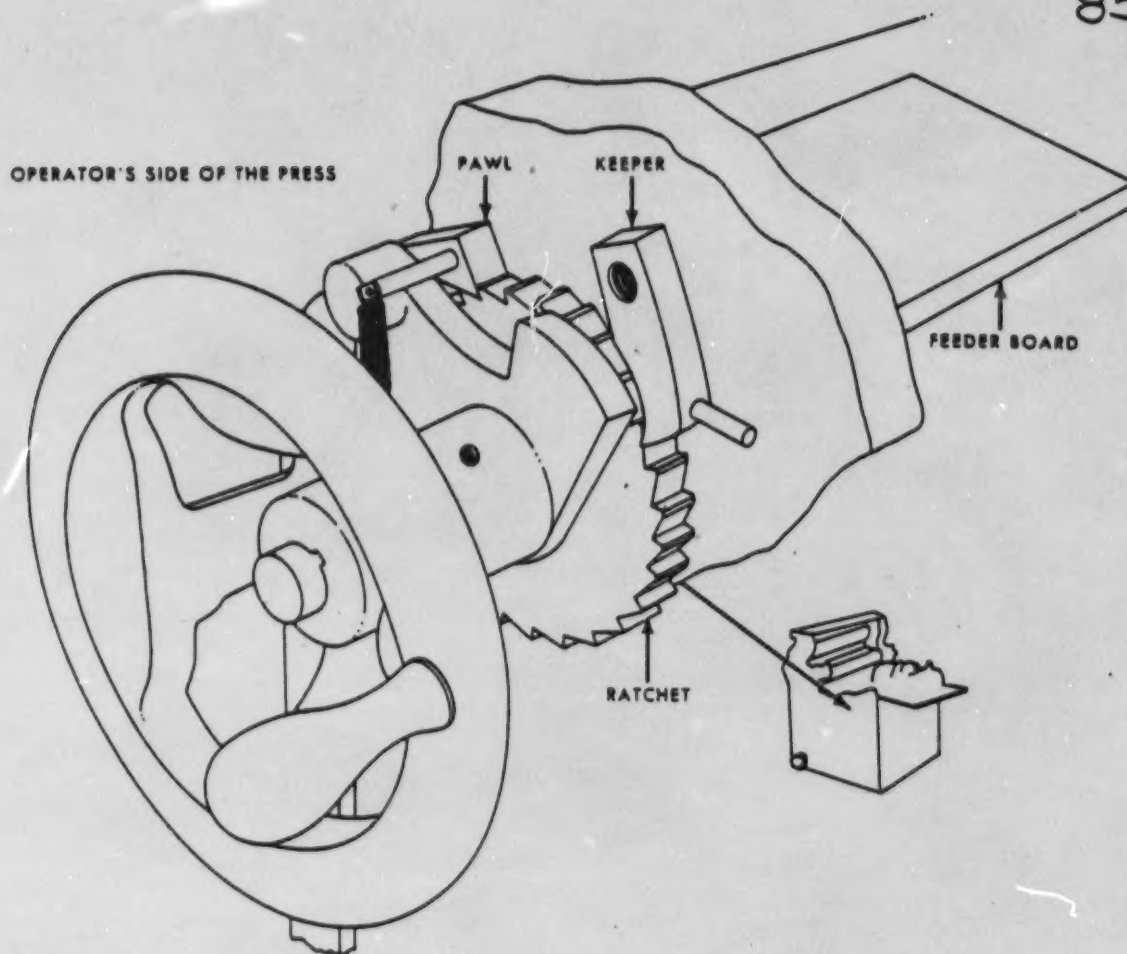


Figure 8-10. Handwheel for manually raising and lowering feeder board.

nism while the press is in motion. Do not position the suckers over the conveyor tapes, as some weights of stock will not have sufficient clearance between the tapes and the suckers. Check all positioning and clearances by turning the flywheel by hand and observing the motion of the sucker bar through a full cycle.

(b) Two types of suckers are furnished with the ATF Model DP press. For heavy stocks, rubber suckers are provided. For lighter stocks, such as map paper, brass suckers are provided. The rubber suckers need no specific positioning. The metal suckers must be positioned so that the open end of the V-shaped slot in the bottom of each sucker is facing the delivery end of the press.

(c) The amount of suction required for best results varies with different weights of stock. The suction control is located on the gear side of

the ATF Model DP press (fig. 8-14). The construction of the adjustment varies slightly on different press models. However, the principle is the same on all presses—the smaller the opening, the greater the amount of suction at the suckers; the larger the opening, the less the suction.

(d) In order to pick up sheets from the feeder board, suction must be started and supplied to the suckers. Start the air pump by pressing the blower start button and then close the feeder valve, as indicated in figure 8-13, to establish suction at the suckers.

(e) The suction is timed by a cam on the gear side of the press. This cam is located just below the front edge of the conveyor board. As the sucker bar drops, while the press is operating, the cam causes a cover to close the suction inlet, pulling air through the suckers and picking up a

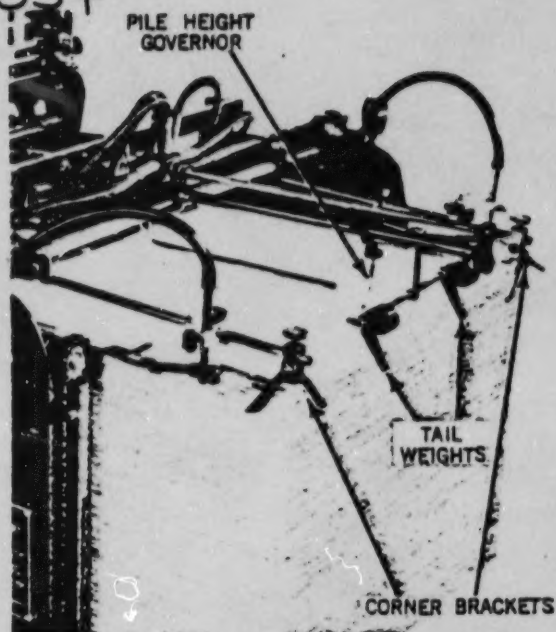


Figure 8-11. Feeder board rear pile guides.

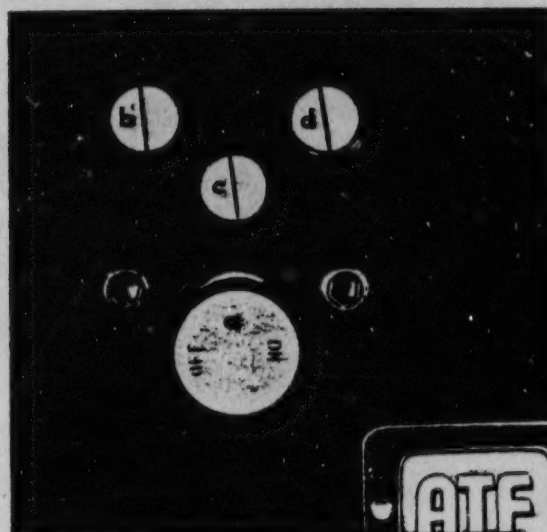


Figure 8-12. Air blast controls on ATF Model DP.

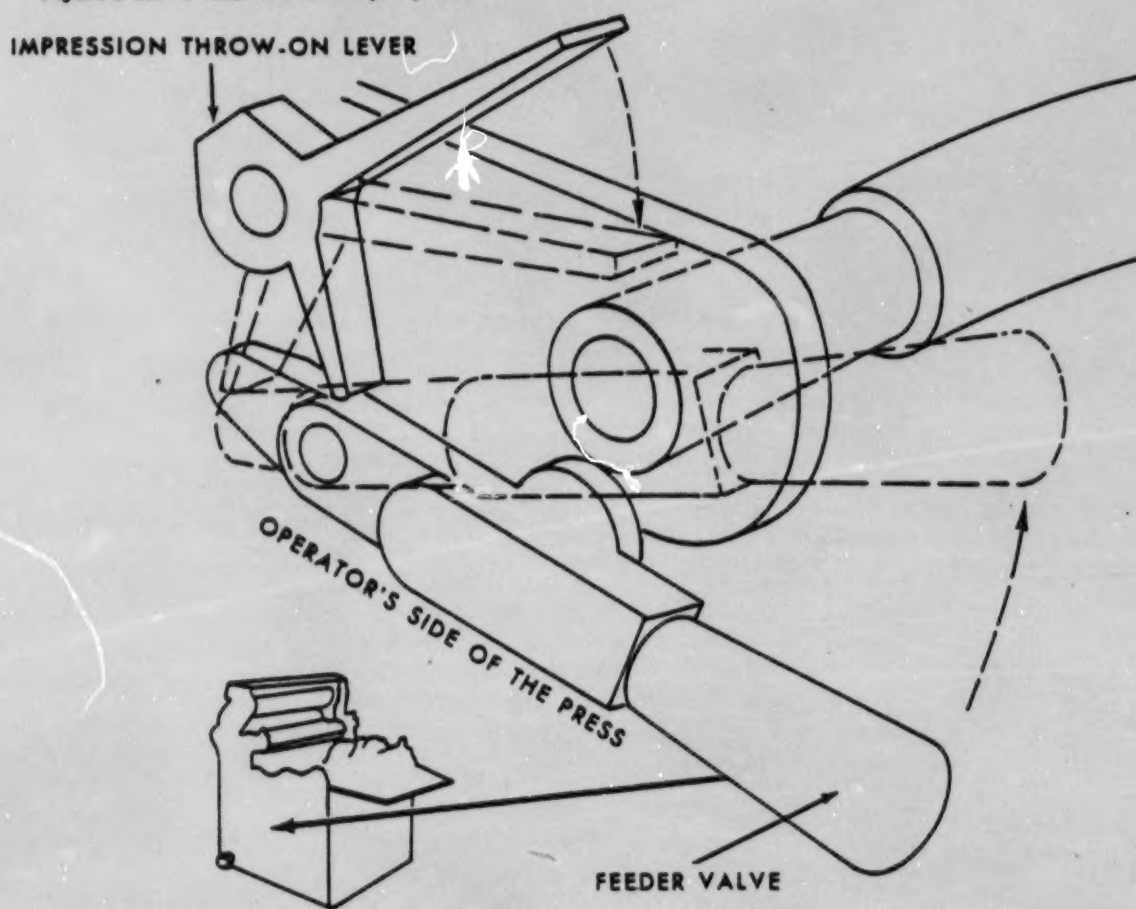


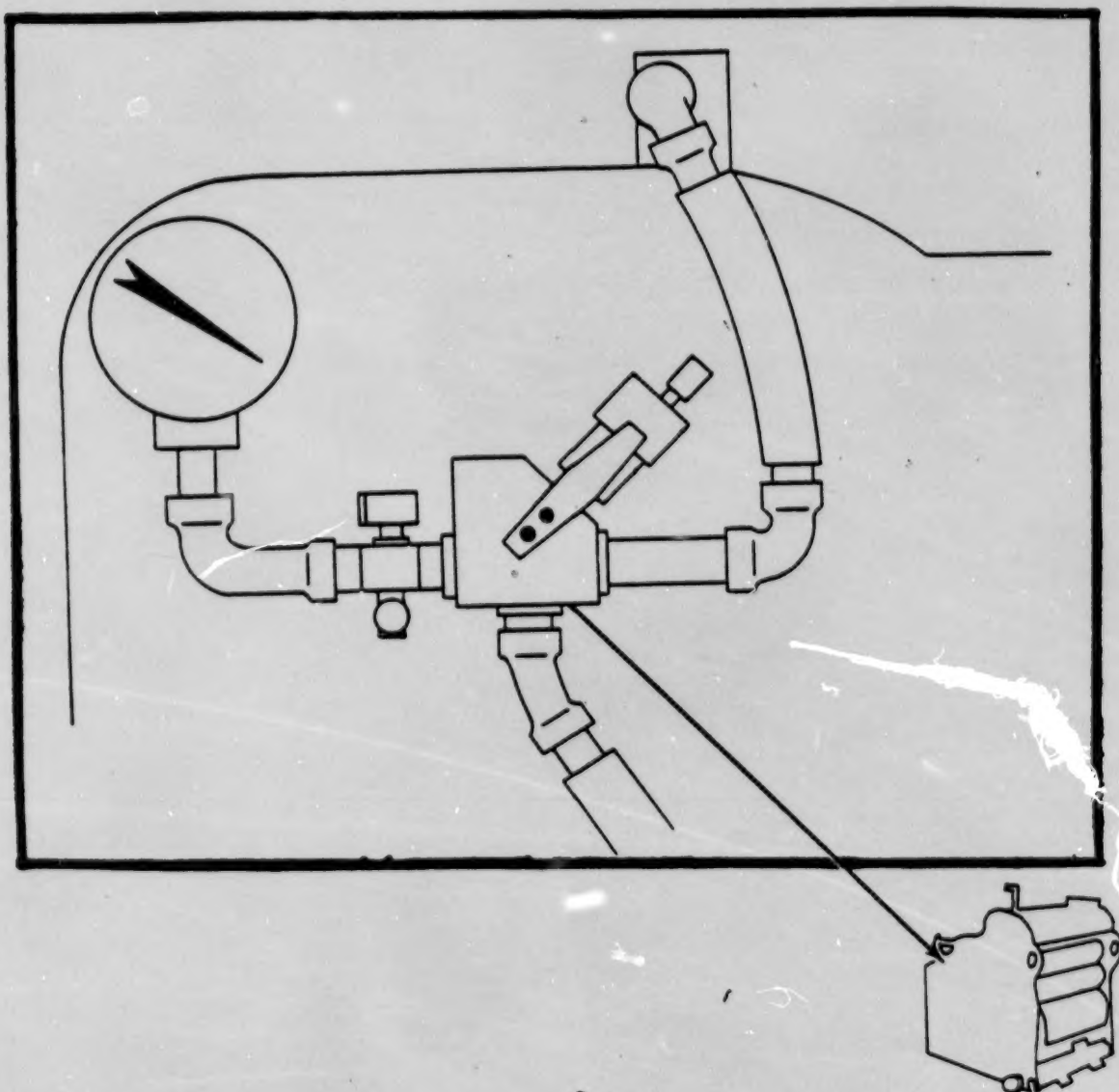
Figure 8-13. Feeder valve, or air suction lever.

sheet. When the suckers reach their highest point, the cam opens the suction inlet, causing the suckers to release the sheet.

(3) *Sheet separators* (fig. 8-7). The sheet separators need not be adjusted until a different type of paper stock is used. They are set so that the hook on the top of the separator protrudes slightly over the top sheet on the pile when the airblast is on. Use care when setting the sheet separators because they are very easily bent. If it is necessary to adjust the separators, make sure that the safe switches are in the "safe" position.

c. Adjusting Sheet Transporting and Positioning Equipment on Converyor Board.

(1) *Adjusting conveyor tapes and pull-in wheels.* The tension on the conveyor tapes can be varied by adjusting the idler rollers under the conveyor board. This adjustment does not have to be made very frequently. The pull-in wheels should be set with equal tension or pressure against the conveyor tapes so that the sheets move uniformly. Unequal pressure between the two pull-in wheels will cause the sheets to twist or slow down as they pass down the conveyor board. The pull-in wheels



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Figure 8-14. Suction control—ATF Model DP.

are adjusted by thumbscrews located behind each wheel (fig. 8-15). Turning the thumbscrews clockwise will lessen the pressure. The safe switches must be in the "safe" position when making this adjustment.

(2) *Adjusting two-sheet chokes.* Set the two-sheet choke, or caliper, so that only one sheet of the stock being run can pass through at one time. On the feeder board side of the two-sheet choke are a thumbscrew and locking bar which are the means of adjustment. Insert a piece of the paper stock being run under the choke. There should be no drag on the single sheet of paper as it passes under the choke. Turn the thumbscrew counterclockwise to tighten the pressure on the sheet and clockwise to lessen the pressure. Then try two sheets of paper. They must not be able to pass through the choke simultaneously. Check the press to make sure safe switches are in the "safe" position before making this adjustment.

(3) *Adjusting front guide bar.* Adjust the front guide bar so that it is parallel to the leading edge of the impression cylinder and place it in the center of its adjustment range before the start of

every run. Make this adjustment by turning a horizontal screw at each end of the bar. To make the adjustment, turn the screws all the way in (clockwise) and then out (counterclockwise) two full turns. This will set the screws in the center of their adjustment range of four full turns, and also make the front guide bar parallel to the leading edge of the impression cylinder. Never turn the screws out more than four full turns or the impression cylinder gripper fingers will not grasp the sheets properly. To position sheets, the front guide bar can be adjusted to make slight changes in the gripper margin. This must be done only after the plate has been twisted as far as possible (para 8-16g(1)), or when the adjustment is very small. The gripper edge margin is increased by turning the horizontal front guide bar adjusting screws in (clockwise) and decreased by turning the screws out (counterclockwise).

(4) *Adjusting front guides.*

(a) Adjustment of the front guides shall be made only by a press erector or senior pressman, but the following instructions for adjustment are presented for the general information of the inexperienced pressman.

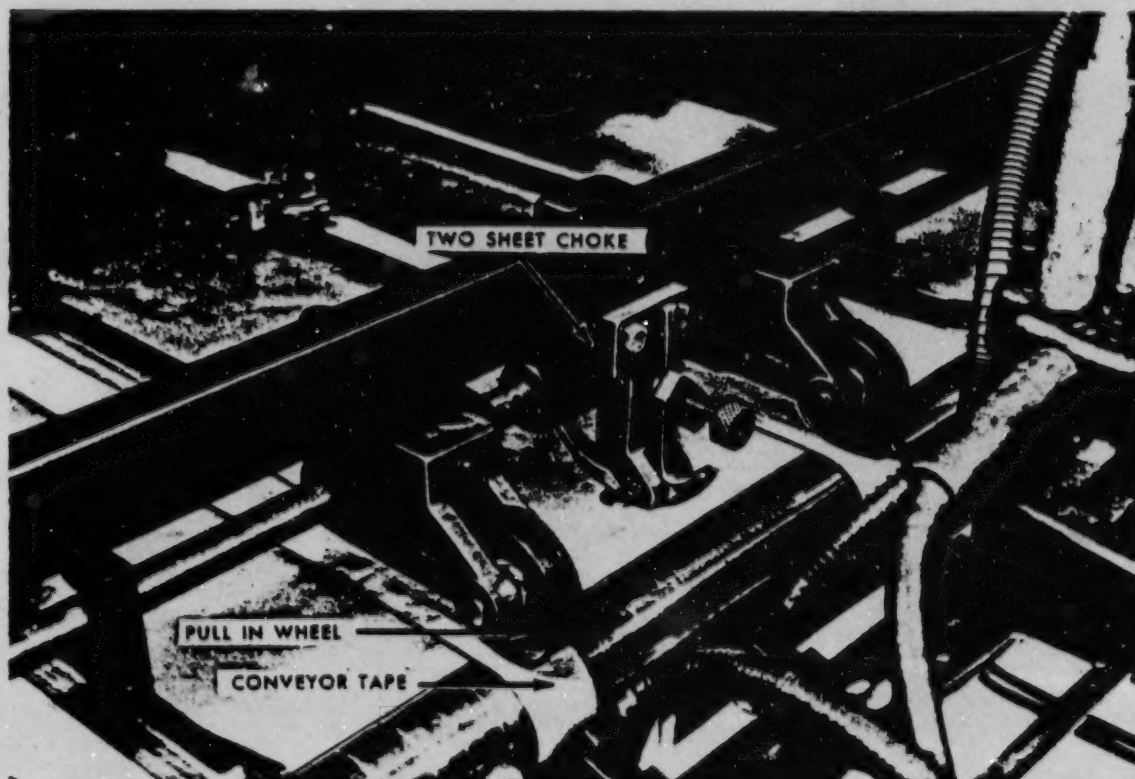


Figure 8-15. Two-sheet choke or caliper 893

(b) The individual front guides must be adjusted so that they are perfectly parallel with each other and with the leading edge of the impression cylinder. The adjustment for this is a horizontal knurled screw, located on the feeder side of each front guide. The minimum gripper bite is $3/16$ inch, and the maximum gripper bite is $5/16$ inch. Safe switches must be in the "safe" position before making this adjustment.

(c) Each front guide has an adjustment to compensate for different thicknesses of stock. It is a vertical knurled screw, located at the bottom of the guide. This screw adjusts the distance between the spring-steel part of the front guide and the undertongue. The undertongues are pieces of spring steel, mounted on a bar under the conveyor board. They fit between the guiding portion of each front guide and the surface of the impression cylinder. The function of undertongues is to prevent sheets from sliding under the front guides into the impression cylinder gap. They must be set to clear the surface of the impression cylinder by .005 of an inch. This adjustment must also be made by a press erector or senior pressman only. The spring steel part of the front guides is adjusted to allow the stock being run to pass through with about .002 of an inch clearance. The gap between the undertongue and the spring steel part of the front guide is increased by turning the vertical knurled screw out (counterclockwise) and decreased by turning the screw in (clockwise).

(5) *Setting side guides.*

(a) When the front guides stop a sheet of stock as it is moving forward and hold it until it is grasped by the impression cylinder grippers, the sheet is then positioned properly for impression in one direction, but it is not yet properly positioned laterally. This action is accomplished by the side guide which pushes the sheet from the side to its proper side-to-side position.

(b) To set the side guide, feed a sheet from the feeder pile to the front guides. First, start the air pump; then close the feeder valve; then "inch" the press until the sheet hits the front guides and the impression cylinder gripper fingers are $1/4$ of an inch from closing. At this point, the side guide bar will be at the limit of its inward thrust. Loosen the vertical knurled screw on top of the side guide, move the side guide inward until the vertical flange contacts the sheet, and move both the guide and the sheet inward $1/8$ of an inch. This is the recommended side guide push. Any more than $1/8$ of an inch push will buckle the sheet or interfere with its travel, while less than $1/8$ of an

inch push may cause the side guide to misregister some sheets.

(6) *Side guide changeover.*

(a) Two side guides, one on the operator's side of the conveyor and the other on the gear side, are provided to permit accurate registration when printing backup work (i.e., printing both sides of a sheet), although only one side guide is used at a time. By switching from one to the other, it is possible to register a sheet from the same edge when printing on the reverse side. If the side guide arm is on the lower stud and the spring is on the near stud (fig. 8-17a), the push of the side guide comes from the operator's side.

(b) To change the side guide push to the gear side of the press, the following procedure is used: Release the spring from the near stud; remove the pin and keeper from the side guide arm and place the arm on the upper stud; then insert the pin and keeper in the same place in the side guide arm; and attach the loose end of the spring to the stud on the conveyor board (fig. 8-17b). The side guide will now push from the gear side of the press.

(c) To change the side guide push to the operator's side, the reverse procedure is used. First, remove the end of the spring from the conveyor board stud. Then remove the pin and keeper and place the side guide arm on the lower stud. Insert the pin and keeper in the same place in the side guide arm and place the spring on the near stud. The side guide is now ready to push from the operator's side of the press. The safe switches must be in the "safe" position when making the side guide changeover.

(7) *Adjusting sheet flattener bar.* The sheet flattener bar, or drop bar (fig. 8-9), located between the front guide bar and the side guide bar, is timed to drop against the sheet just before the side guide pushes it. To set the sheet flattener bar, the press must be in the same position as it was when the side guide was set (i.e., with the impression cylinder gripper fingers $1/4$ in. from closing). On the ATF Model DP the adjustment is made with a vertical screw at the end of the bar on the gear side. A knurled locknut is provided to lock the adjustment. Raise the bar by turning the screw in (clockwise) and lower it by turning the screw out (counterclockwise). Set the bar to just barely touch the sheet. When running very thin paper, set the bar slightly lower in order to form a trough across the sheet. This trough gives added strength to the sheet to help prevent it from buckling. Do not set the bar too low, however, or it

will cause the sheets to slow down and miss the impression cylinder grippers.

(8) *Setting sheet guards.* The sheet guards are raised above the conveyor board and run parallel to the direction of the sheet travel. They are adjustable and can be positioned to properly handle various sizes and types of paper stock. Do not position the sheet guards where they could interfere with the operation of the suckers. Use the flywheel to turn the press until the sucker bar is at its most forward position; then locate the sheet guards.

(9) *Setting register wheels.* The register wheels must always be adjusted in two ways: They must be adjusted by their tension springs so they ride against the conveyor tapes with equal tension; they must also be adjusted so that they barely touch the tail edge of the sheets when the sheets are against the front guides. On stock that is less than 22 inches long, position the register

wheels to ride on the inner conveyor tapes. On stock longer than 22 inches, position the register wheels to ride on the two outer conveyor tapes. On stock that is less than 15 inches wide, it may be necessary to place an extra set of register wheels about 7 inches in front of the pull-in wheels to keep tension against the sheet during its travel down the conveyor board (fig. 8-16).

(10) *Other registration devices.* Offset presses are commonly equipped with two other devices to help maintain registration by adding weight to the sheet.

(a) *Rider balls* can be attached to the sheet guards. The rider balls should be positioned above the conveyor tapes, or they will slow down the sheets.

(b) *Brushes* also can be attached to the sheet guards. The brushes may be placed wherever the operator desires for best results with various sizes and conditions of paper stock.

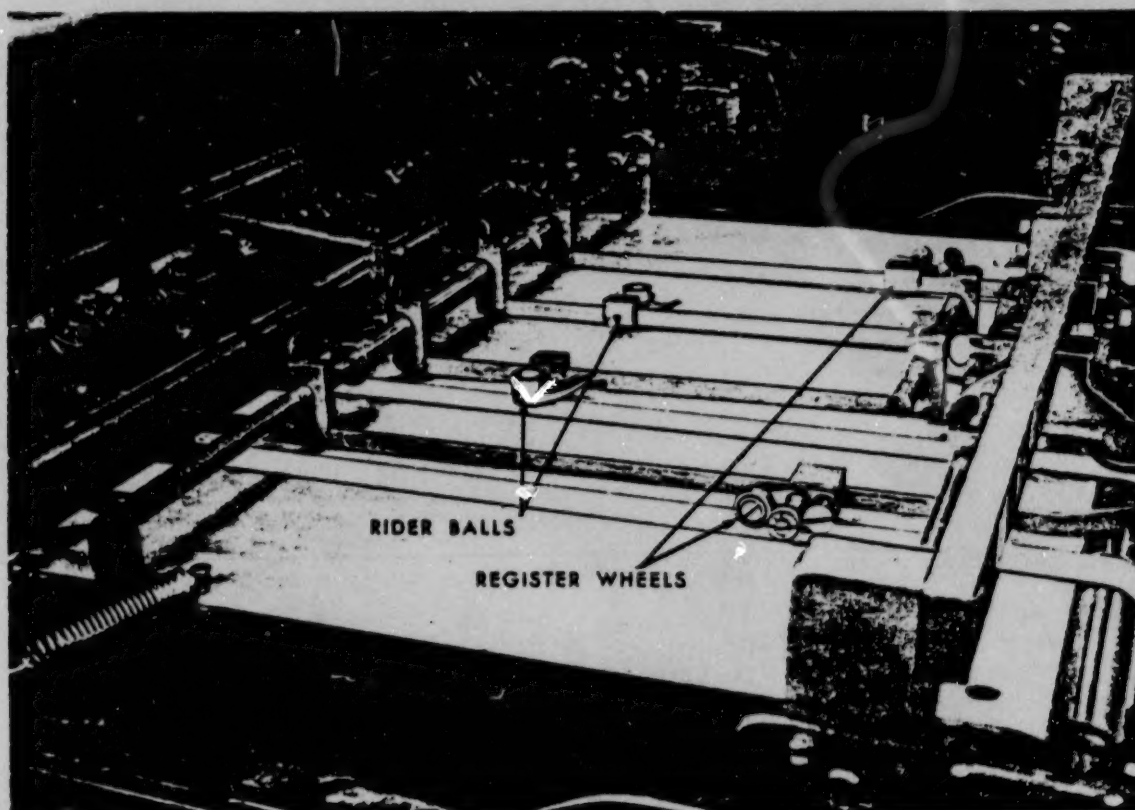


Figure 8-16. Register wheels and other registration devices.

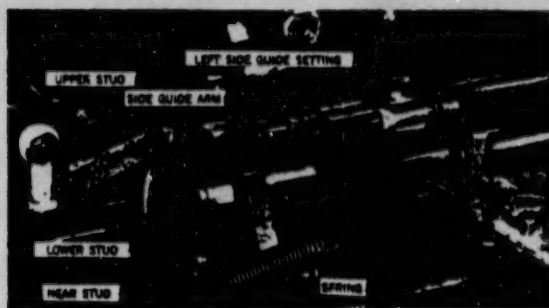


Figure 8-17. Side guide setting for push from operator's side.



Figure 8-17—Continued.

Section IV. DELIVERY ASSEMBLY

8-11. Introduction

The delivery assembly on the ATF Model DP press is that part of the paper-handling cycle which, after the sheets have been carried past the printing pressure point by the impression cylinder grippers, carries the printed sheets to the delivery

board by a system of chain-driven, cam-operated delivery gripper fingers. In addition, the delivery assembly jogs the sheets into a neat, even pile on the delivery board, permitting easy, post-press handling of the sheets. Figure 8-18 illustrates the action of the delivery assembly in a simplified sketch.

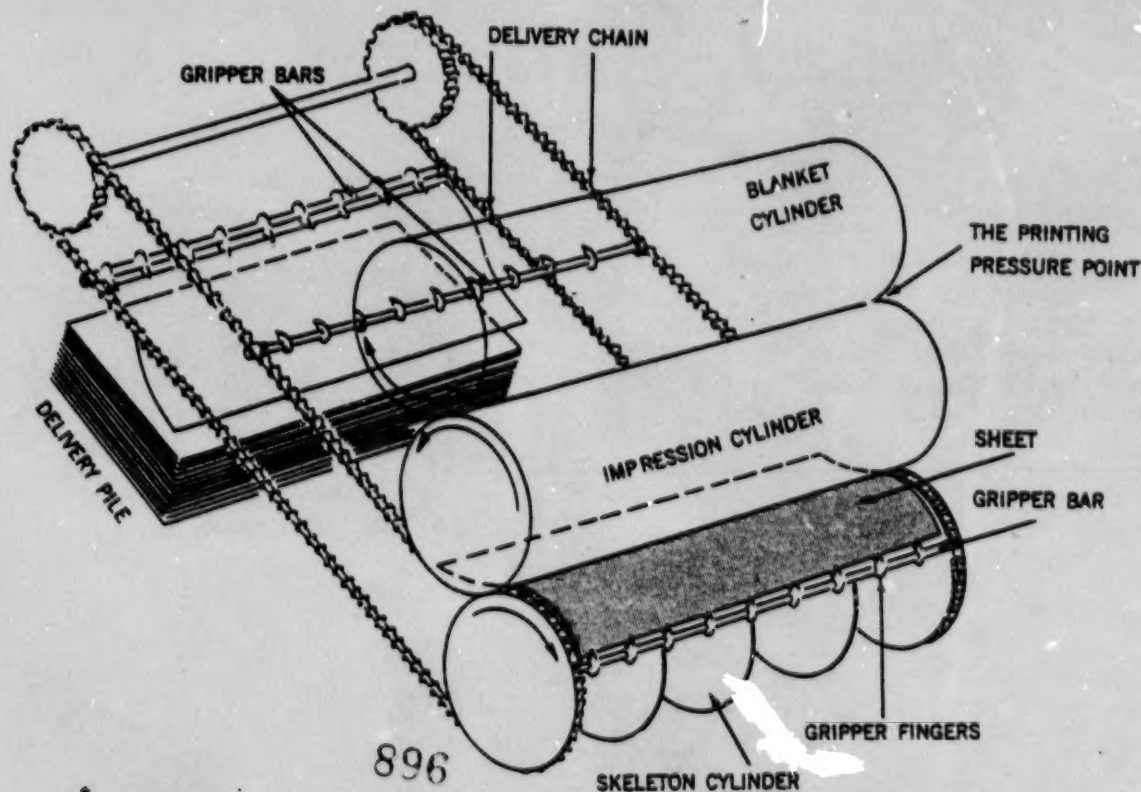


Figure 8-18. Delivery assembly (schematic sketch).

8-12. Delivery Assembly Nomenclature

Part	Function
Gripper bars -----	Used to transfer the sheets from the impression cylinder to the delivery board. Each of the gripper bars has nine delivery gripper fingers (fig. 8-18).
Delivery gripper fingers.	Used to grasp the sheet from the impression cylinder grippers and carry the sheet to the delivery board (fig. 8-18).
Skeleton cylinder ----	Used to drive the feeder system and the delivery system (fig. 8-18).
Sheet stops -----	Used to keep the sheets from dropping over the edge of the delivery board after they have been released by the delivery gripper fingers (fig. 8-19).
Stripper fingers -----	Used to strip off any sheets that may stick to the delivery gripper fingers (fig. 8-19).
Delivery board -----	Receives the sheets when they are released from the delivery gripper fingers (fig. 8-19).
Jogger blades -----	Used to keep the pile of sheets on the delivery board neat and even (fig. 8-19).
Automatic pile receder.	Allows the delivery board to lower automatically at a rate of speed determined by a pawl and ratchet attached to the manual handle (fig. 8-20).
Manual control handle.	Used to lower (or raise) the delivery board manually (fig. 8-20).

8-13. Operational Instructions

In contrast to the feeder assembly, which requires many small adjustments, the delivery assembly operates automatically, for the most part. There are no operational adjustments to be made to the delivery gripper fingers or gripper bars, nor to the skeleton cylinder, nor to the sheet stops or stripper fingers. Only the jogger blades and the delivery board are adjusted or set by the operator in normal operations.

a. Setting Jogger Blades. To set the jogger blades, loosen the thumbscrew on the two side blades, and move the blades outward so they will not interfere with the sheet as it drops down to the delivery board. Then inch a sheet of stock through the press and allow it to drop to the board. Take care that the sheet is positioned directly below the point where the delivery gripper fingers release the sheet. Inch the press until the blades at the back of the delivery board have moved forward their maximum distance. This point is reached when one of the gripper bars has just reached the upper level on the delivery chain cycle. Then move the side blades inward until they contact the sheets snugly, and retighten their thumbscrews. After making certain that the sheet is touching the sheet stops on the front edge of the board, loosen the knurled screws on the back jogger bar and move the bar forward until its blades come in contact with the tail edge of the sheet. Then retighten the knurled screws on the back jogger bar.

b. Setting Automatic Pile Receder. To adjust the automatic pile receder (fig. 8-20), engage the pawl and raise the pawl control handle to the desired position. The higher the handle is raised, the greater the rate at which the delivery board will lower. The thicker the stock, the greater the lowering rate at which the delivery board must be set. The feeder valve must be closed in order to make the automatic pile receder operate.

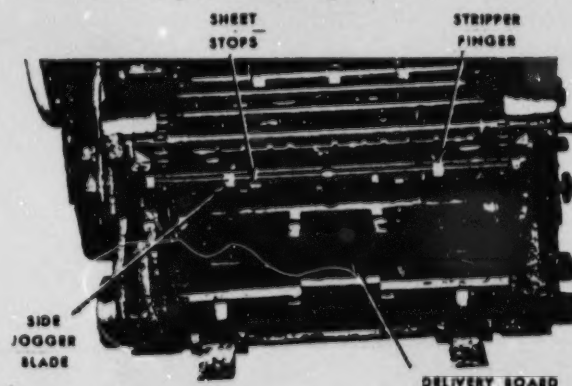


Figure 8-19. Delivery assembly.

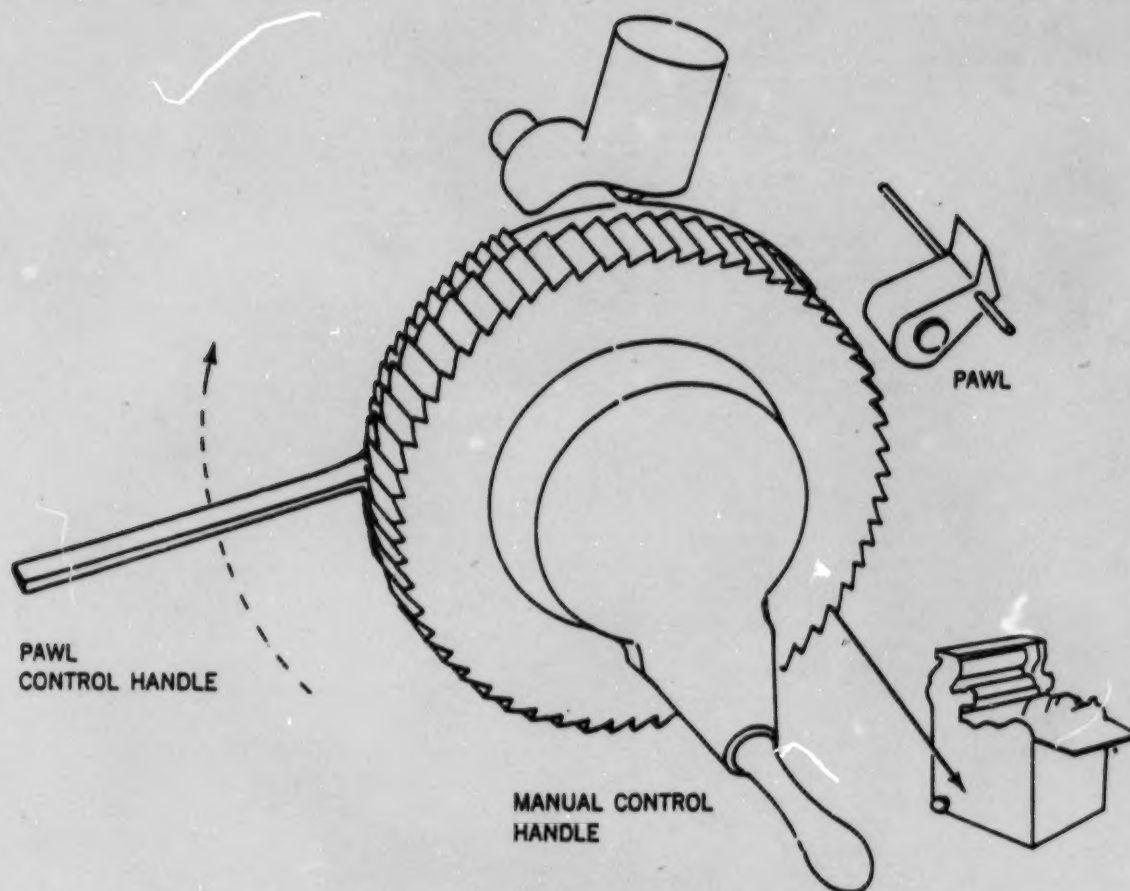


Figure 8-20. Delivery board lowering mechanism.

Section V. CYLINDER ASSEMBLY

8-14. Introduction

The cylinder assembly transfers the inked image from the plate to the blanket and then to the paper. On the ATF Model DP press, the assembly consists of the three main cylinders—the impression cylinder, the blanket cylinder, and the plate cylinder—which constitute the “heart” of the offset press. The impression cylinder grasps the prepositioned sheet at the front guides and carries it into contact with the blanket cylinder. Meanwhile, a plate mounted on the plate cylinder is inked and it transfers its image to a rubber blanket mounted on the blanket cylinder. The blanket, in turn, transfers or “offsets” the image to the sheet of paper on the impression cylinder. The impression cylinder continues to revolve and carries the printed sheet around to the point where the sheet is transferred from the grippers on the impression

cylinder to the delivery gripper fingers on the gripper bar. See figure 8-21 for a simplified presentation of the cylinder assembly.

8-15. Cylinder Assembly Nomenclature

Part	Function
Plate cylinder -----	Carries the plate and revolves so as to bring it into contact, first, with the dampening assembly; second, with the inking assembly; and, last, with the blanket (fig. 8-21).
Plate clamps -----	Metallic bars attached to plate cylinder, used to position and tighten the plate.
Plate -----	Carries the image which, when it is inked, makes the impression on the blanket (fig. 8-21).

Part	Function
Cylinder undercut	A recess of the surface of a cylinder relative to its bearer ring which allows space for the plate or blanket to be added plus any packing which might be needed (fig. 8-22).
Packing	Sheets of paper placed under a blanket or a plate to increase the circumference of either (not illustrated).
Bearers	Steel bands encircling the outside edge of each cylinder and used to maintain correct separation between cylinder surfaces (fig. 8-22).
Blanket cylinder	Carries the blanket, bringing it into contact, first, with the plate, and second, with the sheet to be printed (fig. 8-21).
Blanket	Carries the image from the inked plate to the sheet (fig. 8-21).
Blanket bar	Metallic bars attached to both ends of the rubber blanket and used to hold the blanket taut against the blanket cylinder (fig. 8-23).
Impression cylinder	Grasps the prepositioned sheet at the front guides and carries it into contact with the blanket cylinder (fig. 8-21).
Impression trips	When they are activated, they cause the blanket cylinder to move away from the plate and impression cylinders. The press is then "off impression." Two of these are manual. The third is automatic and trips the press "off impression" should a sheet fail to reach the finger on the automatic trip at the prescribed time (fig. 8-29).
Counter	Records the number of impressions the press makes while it is "on impression" (not illustrated).
Impression cylinder adjustment handle.	Used to adjust the pressure between the blanket cylinder and the impression cylinder to obtain the correct printing pressure when printing on various thicknesses of stock or when the thickness of the blanket and packing on the blanket cylinder has been changed (fig. 8-24).

8-16. Operational Instructions

a. *Cleaning Plate and Plate Cylinder Before Mounting Plate.* Before a quality job can be pro-

duced, the plate and all cylinder surfaces and bearers must be clean.

(1) *Cleaning plate.*

(a) Cover the working area with clean paper and place the plate on it, image side down. Use a clean, soft, water-saturated cloth to wipe the back of the plate thoroughly. The types of dirt most likely to be found on the back of the plate are accumulations of gum arabic, which get stuck on the rear of the plate while the image side is being covered with a protective coating of gum, and grit, which may get on the back of the plate as it is handled by the plate maker. Dirty areas, which project above the smooth surface of the back of the plate, can be found by sliding your hand over the plate surface.

(b) If any dirt remains after wiping with a wet cloth, scrub the dirty area with an ink solvent and/or pumice powder. The smallest lump of dried gum or grain of grit can cause a high spot to develop on the plate when it is mounted on the cylinder. Such high spots can be the source of a great amount of difficulty when the plate is inked for printing.

(c) When using any of these cleaning methods, take special care that none of the materials used injure the image on the plate. Water will dissolve the protective gum arabic coating on the image surface of the plate and allow the metal to oxidize. An ink solvent is apt to cause the image to lose its affinity for ink. Pumice powder will scratch and grind the image and grain off the plate if it is not used carefully. Never use a sharp, pointed object or scraper of any kind to clean the plate, as it will cause low or high spots in the plate which create difficulties in printing.

(d) Wash hands thoroughly after using any of the cleaning materials to prevent skin irritation.

(2) *Cleaning cylinder surfaces and bearers.*

(a) Dirt on the cylinders, like dirt on the back of the plates, causes high spots which interfere with proper contact between the cylinders.

(b) Most of the foreign matter that accumulates on the cylinder is gum arabic and ink. Water will dissolve the gum arabic, and cleaning solvent will remove the ink.

(c) Remove rust with oil and crocus cloth. Keep a light film of oil on the cylinder and bearer surfaces at all times to prevent rust from recurring.

b. *Packing Blanket and Plate Cylinders.* In order to obtain good printing, a "squeeze" must be

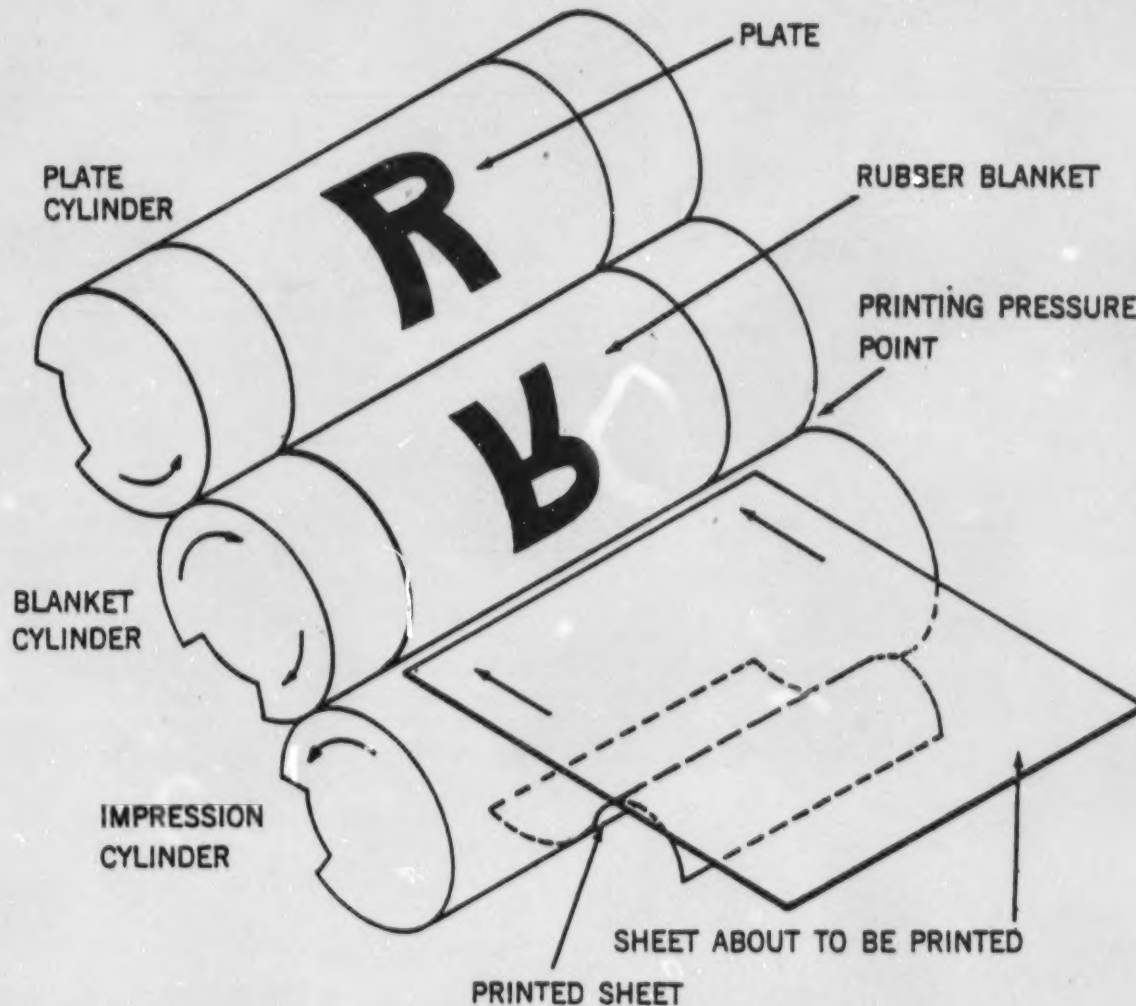


Figure 8-21. Cylinder assembly.

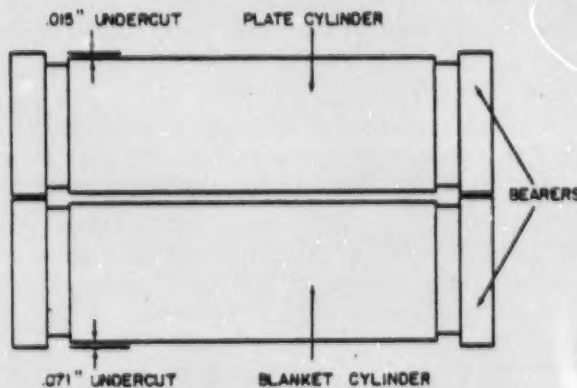


Figure 8-22. Cylinder undercuts.

developed between the plate and blanket cylinders (fig. 8-25). This squeeze is achieved by overpacking the cylinders slightly above their bearer diame-

ters. The packing should total .003 inch more than the clearance between the cylinder bodies when their bearers are in contact. This overpacking is often referred to as .003 inch of pressure or 8 "points" of pressure.

(1) *Cylinder undercuts.* Figure 8-22 illustrates the standard undercut on the plate and blanket cylinders on the ATF Model DP press.

(2) *Packing cylinders.*

(a) The packing of the cylinders shall be done only when the press is stopped and the switches are in the "safe" position. The blanket is underlaid with thin sheets of paper (packing) to raise it .002 inch above the blanket cylinder bearers. The plate is packed to .001 inch above the plate cylinder bearers. Since the bearers are in contact when the impression is "on," this obtains

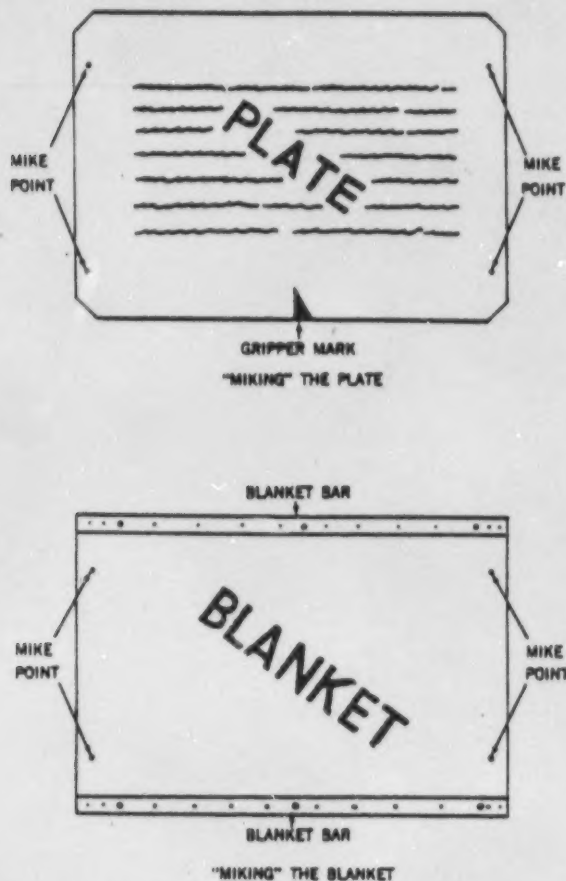


Figure 3-23. Recommended spots for measuring the thickness of plate and blanket with a micrometer (miking).

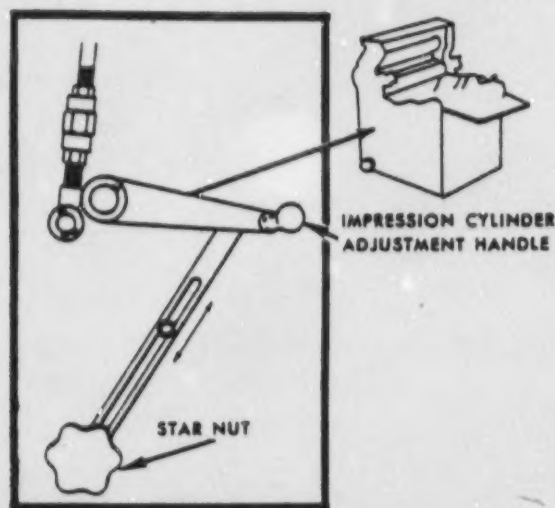


Figure 3-24. Impression cylinder adjustment handle—ATF Model DP.

the printing "squeezes" of .003 inch. Since the blanket cylinder has an undercut of .071 inch and is packed to .002 inch above its bearers, the blanket and packing together total .073 inch. The plate cylinder has an undercut of .015 inch and is packed to .001 inch above its bearers. The plate and packing together total .016 inch.

(b) A tolerance of .0015 inch is permitted when measuring the packing. This allows for the fact that blankets, plates, and packing do not always total the thickness desired. When faced with this problem, it is better to overpack within the tolerance.

(3) *Measuring thickness of blanket and plate.* Blanket and plate thicknesses vary; therefore, they must be measured with a micrometer before being mounted on the press. In order to assure accuracy and prevent errors owing to low spots, the blanket and plate are "miked" in several places and an average taken. The micrometer should not be placed at the gripper or tail edges of the blanket or plate, as the clamps and bars make the surfaces uneven and cause false readings. Also, the micrometer should not be pushed so far onto the material being measured that the material contacts the inside edge of the micrometer frame. This bends the material and causes a false reading (fig. 8-23).

c. Preparing and Mounting Blanket. The blanket on an offset press is changed far less frequently than the plate, but, since the plate cannot be mounted properly unless a blanket is on the blanket cylinder, this section on the preparation and mounting of blankets is presented before the section on plates.

(1) *Putting clamps or bars on new blanket.* When clamping a new blanket, several precautions must be taken to produce the desired result.

(a) Scrub the new blanket thoroughly with pumice powder and cleaning solvent to remove the slight glaze caused by oxidation of the rubber.

(b) If the blanket has not been punched, place a blanket bar, or clamp, across one end of the blanket at right angles to the direction of the arrow on the canvas side of the blanket. Aline the blanket bar evenly with the edge of the blanket. Insert a pencil into each hole in the blanket. The pencil marks will then correspond exactly with the holes in the blanket bar. Follow the same procedure on the other end of the blanket. Make certain that the second bar is parallel to the first. Then remove the blanket bars and punch in or cut out all of the indicated holes. Cut the holes cleanly

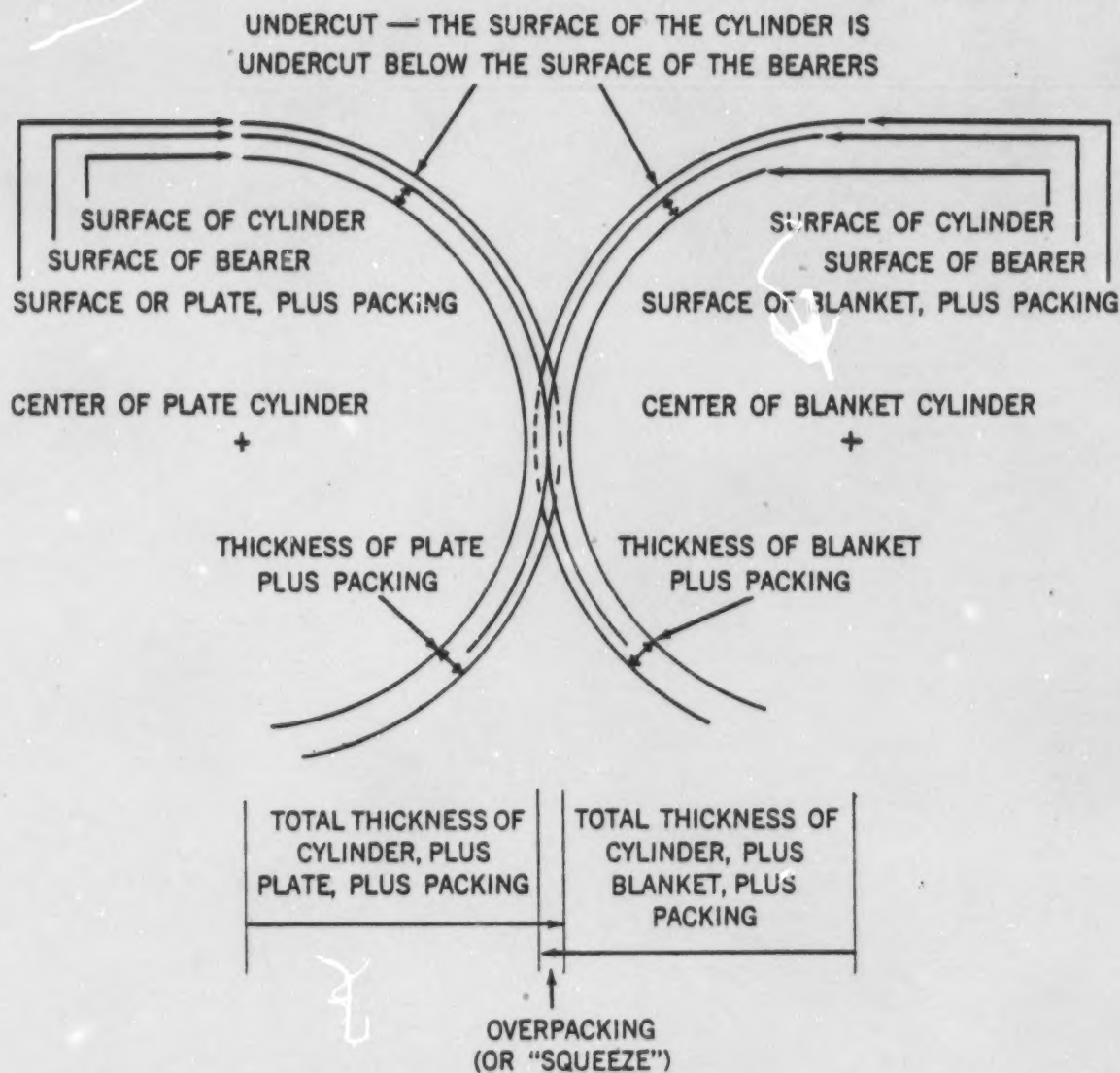


Figure 3-25. Overpacking plate cylinder and blanket cylinder.

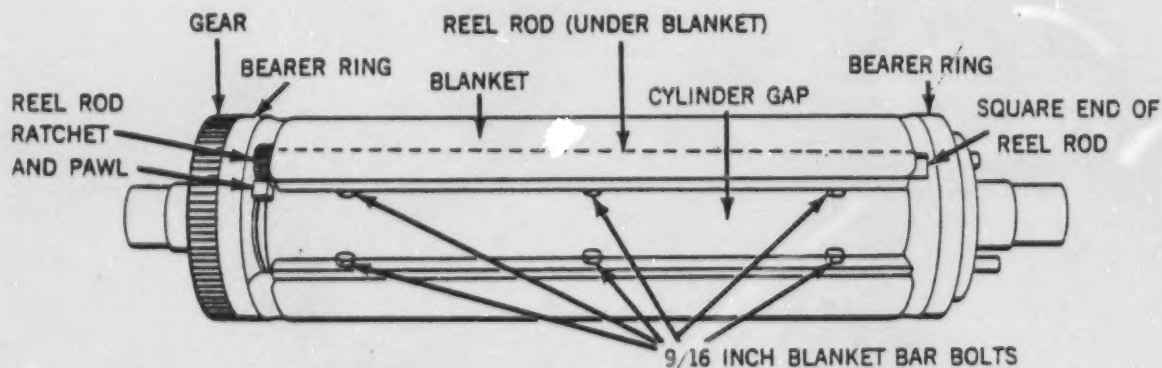


Figure 3-26. Blanket cylinder assembly.

because irregular fragments of rubber may cause the blanket bar bolts to bind. Attach the bars to the blanket.

(2) *Mounting blanket* (fig. 8-26).

(a) Before working on the blanket or plate, remove the cylinder guard. This guard, of course, is never removed until the operator has assured himself that the safe switches are turned to "safe," disconnecting all power from the press. As long as this guard remains off, the cylinders can be moved only by turning the flywheel manually. Power must *never* be used while mounting a blanket or plate.

(b) The blanket is first "miked." Check several points, not near the blanket bars, and take an average. Select sufficient paper packing to total .073 inch when added to the thickness of the blanket.

(c) Place one blanket bar on the lower surface of the gap in the blanket cylinder. Pass three 9/16 inch bolts through the holes in the blanket bar and into the threaded holes in the cylinder gap, and tighten the blanket bar to the cylinder. Do not force these bolts. If they do not turn freely, it may be because they are binding on rubber. If they are, the holes in the blanket must be cut larger. Care must be taken to start the bolts properly in the threaded holes, or misthreading will result.

(d) Turn the cylinder slightly forward by hand, until it is possible to insert the packing sheets behind the blanket. Then turn the cylinder forward three quarters of a revolution until the blanket covers the blanket cylinder and the free-blanket bar is at the top of the cylinder gap.

(e) Attach the free-blanket bar to the reel rod with the three remaining 9/16 inch bolts. Take special care to prevent misthreading these bolts. It is best to start the center bolt first.

(f) Place a 1-inch wrench on the square end (operator's side) of the reel rod. A pawl and ratchet at the other end of the reel rod will hold the blanket tight. Engage the pawl into the ratchet and pull the wrench to tighten the blanket around the cylinder. Use only the pressure and leverage of the hands on the wrench when tightening the blanket. Never use a wrench longer than the one furnished with the press.

(g) The tautness of the blanket can be determined by tapping the surface of the blanket between the reel rod and the tail edge of the blanket cylinder with the finger or some object that will not cut or otherwise injure the blanket surface.

(h) When removing the blanket, first release the tension from the reel rod. Then remove the three bolts locking the blanket bar to the reel rod and turn the cylinder backwards *by hand* until the blanket is off the cylinder. Remove the three bolts locking the other blanket bar and the blanket from the cylinder. Dispose of the paper packing if it has become wrinkled or sticky.

d. *Preparing and Mounting Plate* (fig. 8-27)

(1) Before working on the plate, remove the cylinder guard. This guard, of course, is never removed until the operator has assured himself that the safe switches are turned to "safe," disconnecting all power from the press. As long as this guard remains off, the cylinders can be moved only by turning the flywheel manually. Power must *never* be used while mounting a plate.

(2) The plate must be "miked" before mounting. Check several points, not near the clamp edges, and take an average. Select enough paper packing to total .016 inch when added to the thickness of the plate. For instance, one brand of commercial, presensitized plate averages .006 inch thick which means that approximately .010 inch of paper packing must be inserted under this type of plate.

(3) Loosen the plate clamps by turning the quoin keys counterclockwise and back off the tension screws. This permits a maximum amount of adjustment when subsequently tightening the plate around the cylinder.

(4) With the image side of the plate out, insert the gripper edge of the plate as far as possible into the top plate clamp. If the plate is not inserted into the clamp the full distance, it is apt to go around the cylinder crooked and pull out of the clamp when it is being tightened. Center the plate in the top plate clamp by lining up the gripper center mark on the plate with the scribed centerline on the plate clamp. If the top plate clamp does not have a scribed center line, center the plate in the clamp by alining the right (operator's side) edge of the plate with the right edge of the cylinder surface. When the plate is centered, tighten the top clamp. Make certain that the clamp is flush with the top of the cylinder gap. If the top plate clamp is not perfectly alined with the gap, the plate will not tighten evenly around the cylinder.

(5) In order to position the plate around the cylinder properly, the impression must be "on". To do this, throw the ink motion throw-off handle into its "lockup" position, as shown in figure 8-28. The handle must be pulled toward the operator's

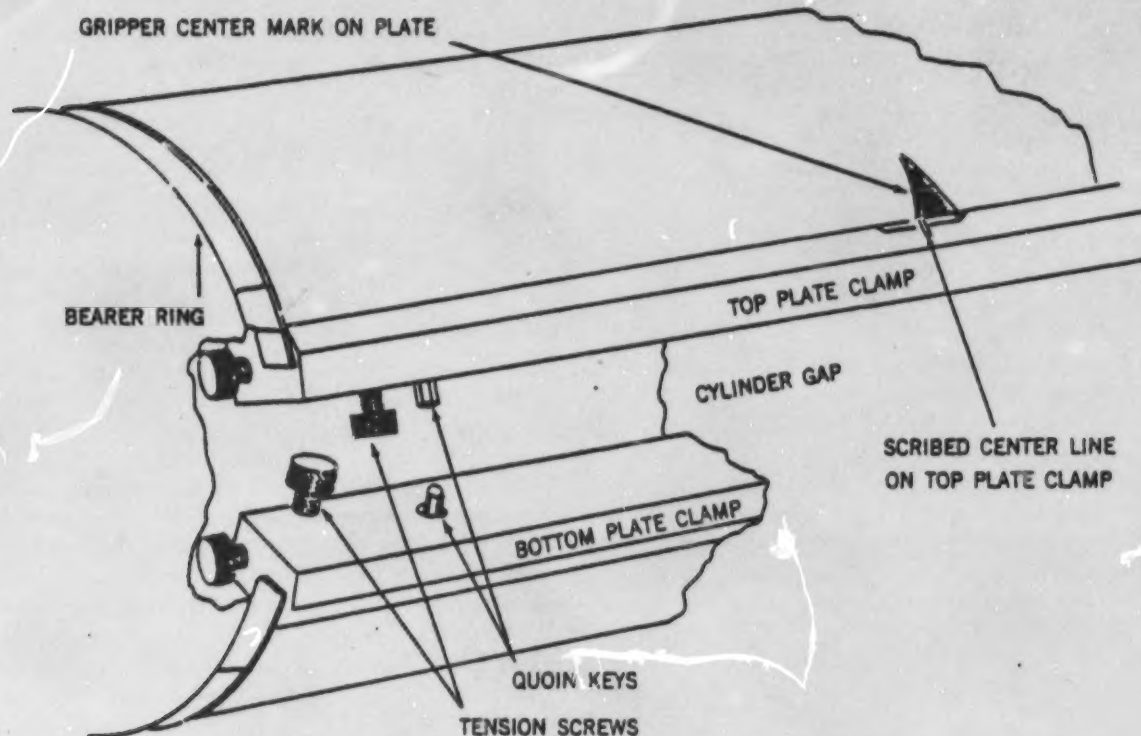


Figure 8-27. Mounting plate on plate cylinder.

side and turned a one-half turn to stay in the lock-up position. This prevents the ink rollers from dropping onto the plate cylinder when the impression is "on." Then place a small strip of paper under the automatic trip (fig. 8-29) to prevent the press from coming off impression while the plate is being mounted. Now press the impression throw-on lever down. This lever is located directly above the feeder valve (fig. 8-13). This causes the impression to be "on" as the press is turned forward; i.e., the impression linkage arm will straighten out and cause the blanket cylinder to move into contact with the plate and impression cylinder. The blanket cylinder must have a blanket mounted on it before the plate can be properly mounted on the plate cylinder. To insure that the press is on "impression" when the plate starts between the cylinders, push down on the impression linkage arm, which causes it to straighten out, before turning the flywheel.

(6) Next, turn the press forward by hand until the plate starts between its own cylinder and the blanket cylinder. Place the correct amount of packing behind the plate, and again turn the press forward by hand until the plate covers the plate cylinder.

(7) Insert the trailing edge of the plate into the bottom plate clamp, and tighten the clamp.

(8) Take the slack out of the plate by tightening the tension screws (fig. 8-27). Do not over-tighten these screws or the plate will be stretched and torn or pulled out of the plate clamps. When a crease begins to appear in the plate at the points where it passes over the cylinder gap, tap the plate gently with a wrench. If the plate is tightened sufficiently, the resulting sound will seem to come from a solid object.

(9) Push either of the manual impression trips, remove the strip of paper from under the automatic trip, and turn the press forward one revolution to take the impression "off." Tear away any excess packing extending past the plate.

(10) When removing the plate, free the tail edge from the bottom clamp first, and turn the press backward by hand until the plate is off the cylinder. Then loosen the plate clamps on the gripper edge and remove the plate from the press.

(11) Flatten the creases in the plate with a plate roller and either place the plate in storage or send it to be grained.

(12) After work on the blanket and plate has been completed, replace the cylinder guard.

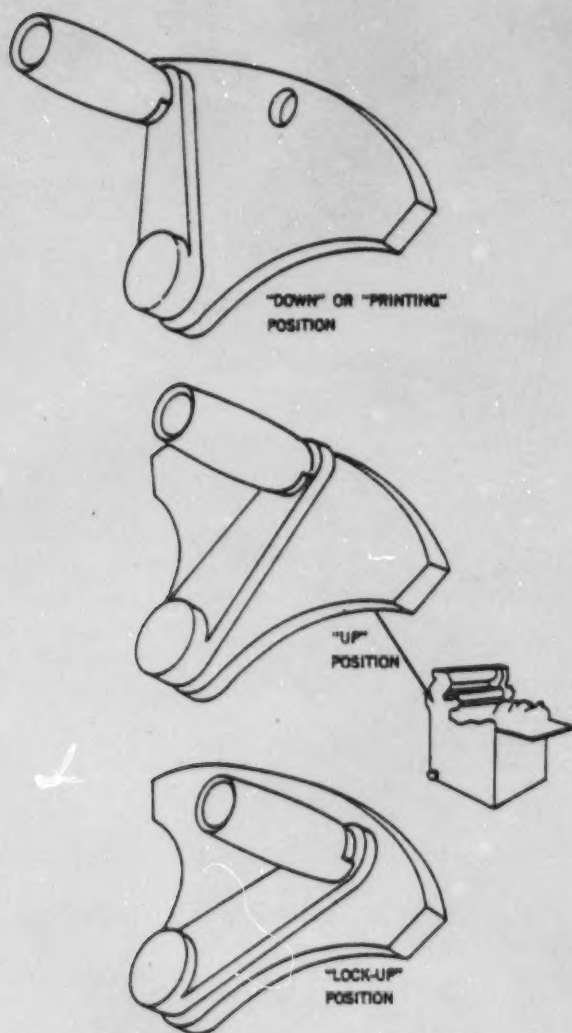


Figure 8-28. Ink motion throw-off handle on ATF Model DP.

e. Adjusting Impression Cylinder.

(1) There are no bearers on the impression cylinder, which means the cylinder can be moved into proper contact with the blanket cylinder when using different weights of stock or when the blanket is packed below the height of the blanket cylinder bearers.

(2) To permit the correct .003 inch "printing pressure" when printing on various thicknesses of stock and to allow for various heights of blanket and packing, the impression cylinder is provided with an eccentric movement. This movement is controlled by the impression cylinder adjustment handle (fig. 8-24) located on the operator's side of the press behind the automatic pile receder. To

increase the pressure between the impression cylinder and the blanket cylinder, loosen the starnut and move the impression cylinder adjustment handle down. To lessen the pressure between the two cylinders, pull the handle up. An adjustment of $\frac{1}{8}$ inch in the position of the handle means an increase or decrease of .001 inch "pressure" between the two cylinders. This adjustment should be made just tight enough to print solid and no more. Extra pressure can cause wrinkles, slurs, and other problems.

f. *Impression.* The three cylinders do not contact each other unless the press is "on impression." When the press is running and the impression throw-on lever is depressed, the impression linkage arm will straighten out and cause the blanket cylinder to move on an eccentric until its bearers contact the plate cylinder bearers and (assuming the impression cylinder adjustment handle is not pulled all the way up) the blanket surface contacts the surface of the impression cylinder. It is in this position only that the image from an inked plate transfers to the blanket and, in turn, to the paper.

(1) *Impression trips.* Any offset press is equipped with trips which, when activated, cause the blanket cylinder to move on its eccentric away from the plate and impression cylinder (i.e., to trip "off impression").

(a) *Manual trips.* The AFT Model DP press is equipped with two manual trips, one located on the operator's side and the other located at the delivery end of the press on the gear side. These need only to be pushed or depressed to activate the "off impression" trip mechanism.

(b) *Automatic trip.* The ATF Model DP press is equipped with an automatic trip located at the center of the conveyor board near the side guide bar (fig. 8-29). Should a sheet fail to reach the finger on the automatic trip at the prescribed time, the finger will engage the "off impression" mechanism beneath the conveyor board.

(2) *Counter.* The counter is an automatic device for keeping track of the quantity of stock being run. There is no way that the counter can record the number of printed sheets that actually reach the delivery pile. The counter records only while the press is "on impression."

g. *Register Adjustments of Plate Cylinder.* When the first sheets are printed during make-ready, it is often found that the image is not properly positioned in relation to the gripper edge of the sheet. Two adjustments of the plate or plate

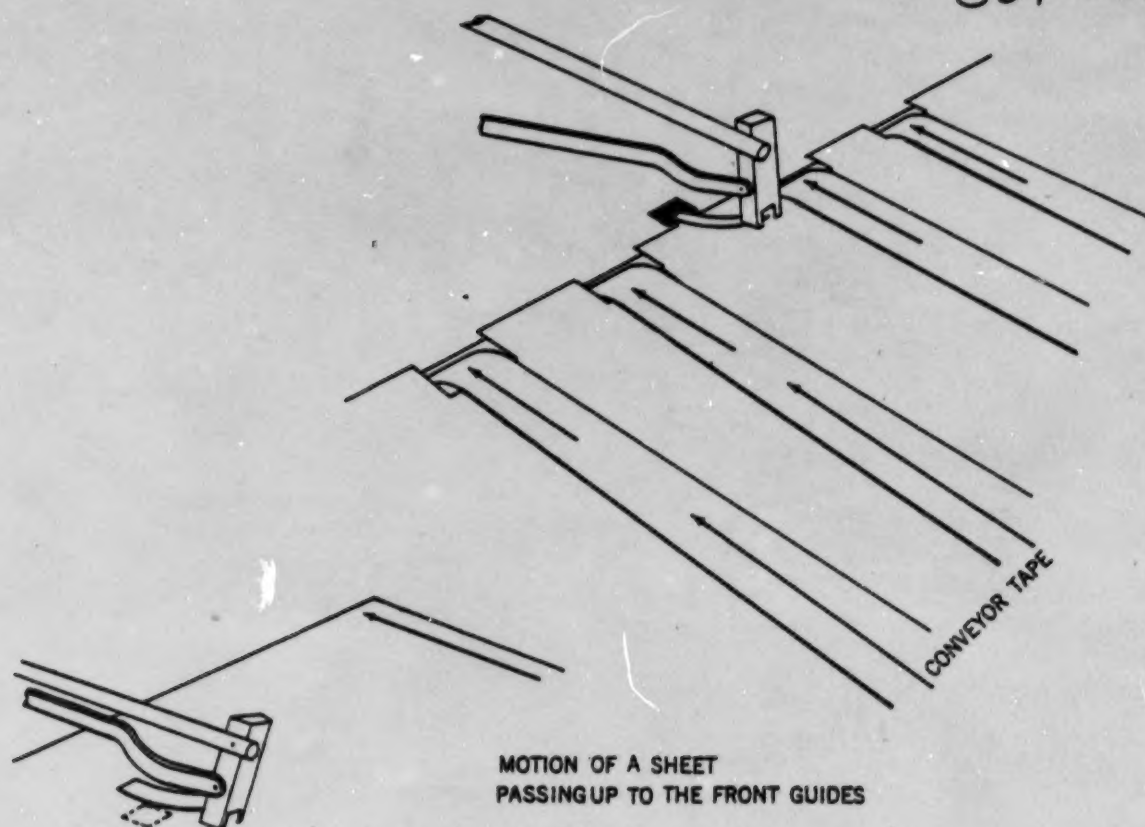


Figure 8-29. Automatic trip mechanism.

cylinder usually correct this. These adjustments shall be made only with the cylinder guard removed and the switches in the "safe" position.

(1) *Twisting plate.*

(a) If the image is slightly crooked in relation to the gripper edge of the sheet, twist the plate to a new position on the plate cylinder.

(b) It is not feasible to try to list all possible adjustments for this operation. The following is only one example of the type of plate-twisting adjustment which may be made on the ATF Model DP press.

(c) Suppose it has been decided, after a printed sheet has been checked, that the image from the plate being run needs to be brought 1/16 inch closer to the gripper edge margin on the right side. To do this, loosen the three tension screws on the bottom plate clamp. Mark a line on the plate and another line on the plate cylinder 1/16 inch ahead, in the direction of the cylinder gap (fig. 8-30). Then start tightening the tension screw in the corner of the top plate clamp. Also tighten the center tension screw to a lesser degree. When the

line on the plate slides forward and is aligned with the mark on the cylinder, the plate has been twisted properly.

(d) The maximum amount that the plate can be twisted is approximately 1/8 inch. Further twisting can tear the plate or pull it out of the plate clamps.

(e) When the plate has been twisted to the desired position, any slack remaining in the plate can be removed by tightening the tension screws. Finally, the old image must be washed from the blanket.

(2) *Swinging plate cylinder.* If the image is parallel with, but too close to or too far from the gripper edge of the sheet, the plate cylinder may be swung to a different position in relation to the blanket cylinder. Swinging the cylinder up causes the image to print farther from the gripper edge of the sheet, providing more margin. Swinging the cylinder down causes the image to print closer to the gripper edge of the sheet with less margin. The amount of swing can be controlled by aligning a mark on the plate cylinder bearer with a plate cylinder gear tooth and observing the distance be-

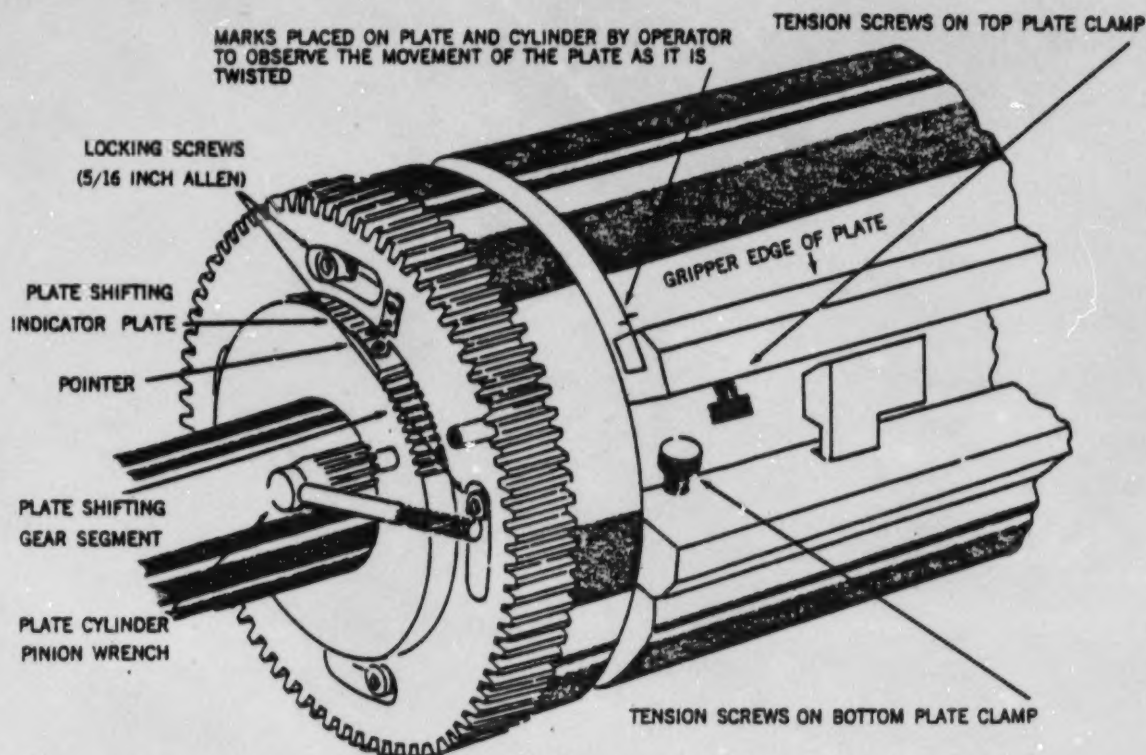


Figure 8-30. Adjustments for twisting and swinging plate.

tween the two points as the cylinder is swung. The maximum amount of plate cylinder swing is $1\frac{1}{2}$ inches ($\frac{3}{4}$ in. either way from the center point). To adjust the ATF Model DP, free the cylinder from its gear segment by loosening the four locking screws on the gear side of the cylinder (fig. 8-30). Loosen the locking screw adjacent to the

plate shifting gear segment last so the plate will not slip. Insert the plate cylinder pinion wrench and engage it with the gear segment. Next, swing the plate cylinder to the desired position. Then, tighten the four locking screws and wash the old image from the blanket. Finally replace the cylinder guard.

Section VI. DAMPENING ASSEMBLY

8-17. Introduction

The dampening assembly is a device for evenly moistening the plate with a special dampening solution as the plate cylinder revolves. This action precedes the inking of the plate. The dampening solution, which clings to the nonprinting areas of the plate, prevents the ink from adhering to any portions of the plate except those which are to be reproduced. This assembly consists of metal and cloth-covered rollers arranged in such a manner that the dampening solution is easily picked up and properly distributed and the plate is moistened evenly. See figure 8-31 for a simplified diagram of the dampening assembly.

8-18. Nomenclature Pertaining to Dampening Assembly

Part	Function
Water pan -----	Used to hold the fountain solution which is to be distributed through the dampening assembly rollers to the plate (fig. 8-31).
Fountain solution ----	A slightly acid liquid, mostly water, used to dampen the nonprinting areas of the plate so that they will repel the greasy ink when the plate is inked (fig. 8-31).

Part	Function
Fountain roller -----	As it revolves, it picks up the fountain solution and transfers it to the dampener ductor roller during the period the ductor is in contact with the fountain roller (fig. 8-31).
Dampener ductor roller.	Conveys the fountain solution from the fountain roller to the rest of the dampening assembly rollers by being in contact with the fountain roller part of the time and touching the dampener vibrator roller the remainder of the time (fig. 8-31).
Dampener vibrator roller.	Picks up the fountain solution from the dampener ductor roller and distributes it evenly to the dampener form rollers. It moves from side to side along its axis as it rotates (approx 1/2 in.) (fig. 8-31).
Dampener form rollers.	Transfers the dampening, or fountain, solution from the vibrator roller to the plate (fig. 8-31).
Water motion throw-off handle and latch.	Controls the motion of the whole dampening assembly to or away from the plate cylinder (fig. 8-32).
Water-on lever -----	Controls the movement of the dampener ductor roller (fig. 8-33).
Water motion control.	Governs the length of time the dampener ductor roller remains in contact with the fountain roller (fig. 8-34).
Water stops -----	Used to control, in a very limited area, the amount of fountain solution on the fountain roller (not illustrated).
Drip pan -----	Used to catch any fountain solution which may drip out of the water pan (not illustrated).

8-19. Operational Instructions

a. *Positioning Entire Dampening Assembly by Means of Different Settings for Water Motion Throwoff Handle and Latch.* The main control for the dampening assembly is the handle and latch mechanism which moves the whole assembly to or from the plate. The three operating positions for the water motion throwoff handle and latch are illustrated in figure 8-32.

(1) In position 1, the dampening assembly is engaged, with the form rollers against the plate. This is the operating position which is used any

time the ink rollers are against the plate, as when printing. This position is identified by the handle being in the top slot of the latch.

(2) In position 2, the assembly is engaged (gears are meshing), but the form rollers do not touch the plate. This position is used when wetting the assembly, idling with gum on the plate, and at various other times when the ink rollers are not in contact with the plate. This position is identified by the handle being in the bottom slot of the latch.

(3) In position 3, the entire assembly is racked back as far as it will go, thus disengaging the gears completely. This position is used when the dampening assembly is not being used, such as when the press is being cleaned or adjusted.

b. *Explaining Action of Water-On Lever.* In order to control the solution transfer from the fountain roller to the other rollers in the assembly, the ductor roller motion is controlled in two ways. One of these controls is the water-on lever. This lever, located just below the side guide mechanism and directly above the feeder valve, on the operator's side, controls the movement of the ductor roller (fig. 8-33).

(1) When the lever is in its "on" position (down), the ductor roller moves back and forth in an arc between the vibrator and the fountain roller, receiving and delivering solution while the press is running.

(2) When the lever is in the "off" position (up), the ductor roller ceases its arcing motion and simply rolls in contact with the vibrator roller, and therefore does not receive or deliver any additional solution.

(3) It is evident why such a control is necessary. When the press is idling and the fabric rollers are sufficiently damp, no more solution need be delivered. While the press is printing, the ductor roller must deliver solution to the form rollers to replenish that lost by evaporation, transfer to the plate, and to the stock. However, when the press is not printing, no solution is being used, and the solution flow must be stopped or an excess will be built up in the dampener rollers.

c. *Setting Water Motion Control Unit.* The second control for the ductor is the water motion control, which governs the length of time the ductor roller remains in contact with the fountain roller. This control is located on the gear side of the press just below the dampening assembly drive gears (fig. 8-34).

(1) By means of an adjustable cam, this de-

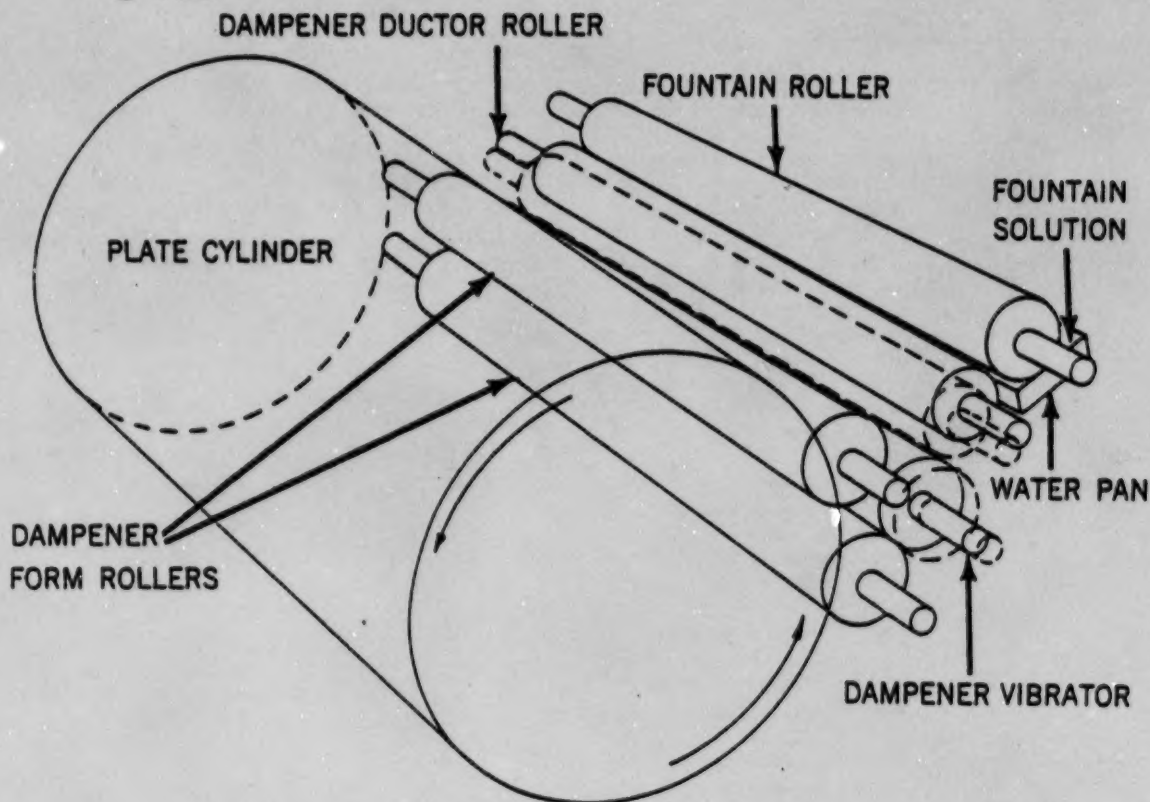


Figure 8-31. Dampening assembly.

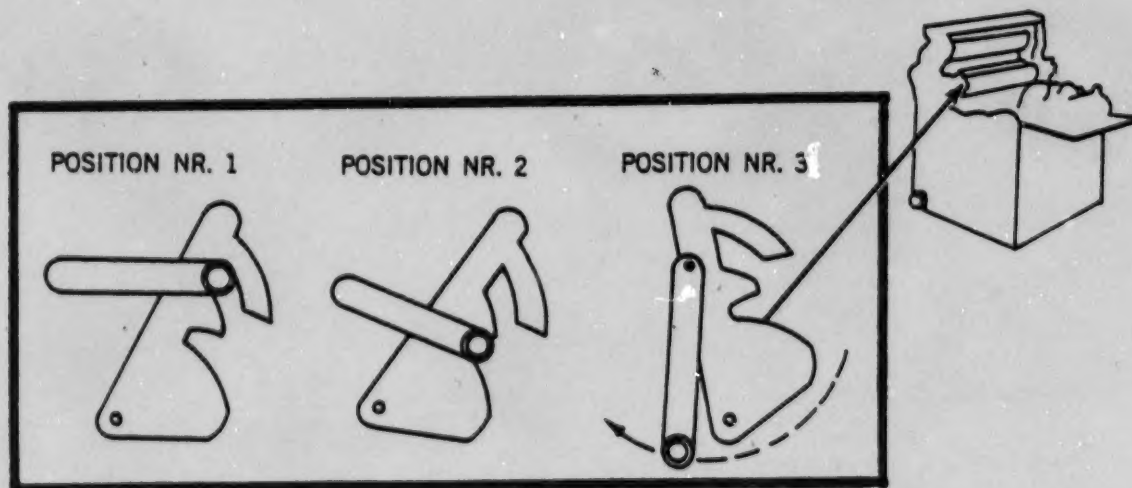


Figure 8-32. Three positions of water motion throwoff handle and latch.

vice controls the period that the ductor contacts the fountain roller, and therefore the amount of solution received by the form rollers. The cam (or a portion of it, depending on the press model),

which activates the ductor roller's arcing motion, can be raised or lowered by means of this control. Raising this cam causes the ductor roller to remain (dwell) against the fountain roller for a

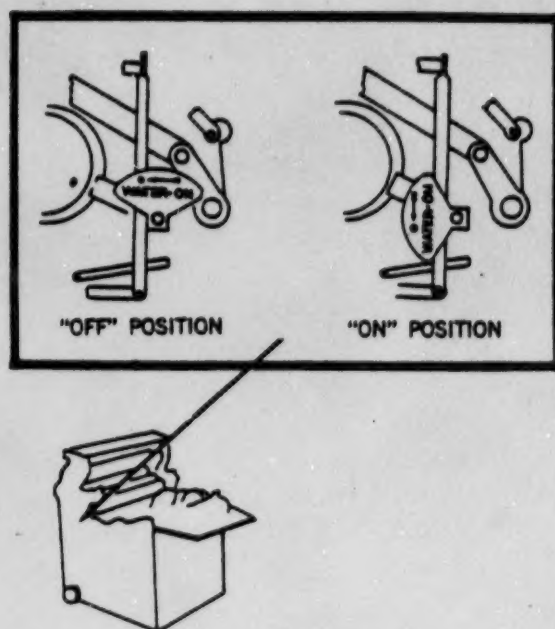


Figure 8-33. Positions of water-on lever.

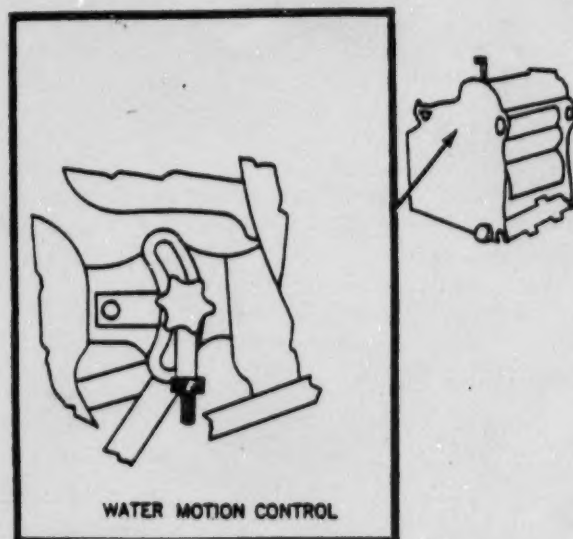


Figure 8-34. Water motion control unit.

longer period of time, thus receiving and delivering more solution. Lowering the cam decreases the amount of solution.

(2) The control unit consists of a bar, a short metal arm, a star-shaped locking wheel, and a knurled thumbscrew. Loosening the locking wheel and turning the knurled knob moves the bar along an arc. Moving the bar up causes the cam to drop down, decreasing the "dwell" and the amount of

solution. Moving the bar down causes the cam to rise, increasing the "dwell" and the amount of solution.

d. Adjusting Dampening Assembly Rollers.

(1) General theory of setting.

(a) *Introduction.* For the dampening assembly to do its necessary job, each component must be correctly adjusted. Fabric-covered rollers cannot hold constant diameters with shrinkage and wear of the fabric, and so must be constantly adjusted to give the best possible transfer of solution from one roller to another. An incorrectly set assembly can cause many troubles during a press run. Dry streaks resulting in scum, and wet streaks resulting in loss of color are two of the many possible troubles. The only roller in the dampening assembly that is not adjustable is the vibrator roller. This roller is permanently set in the unit and as such is always parallel to the plate cylinder. For this reason, it is often called the base roller. All of the other rollers are set to or from the vibrator roller, directly or indirectly. The theory of roller setting should be thoroughly understood by each operator before he attempts to make any adjustments himself.

(b) *Use of strips of paper or acetate as feelers.* To check the pressure of one roller to another, strips of paper or acetate, .003 to .004 inch thick, are used as feeler gages. The strips are placed between the rollers to be adjusted and then withdrawn. The pressure or "drag" on the strips is indicative of the pressure between the rollers. The rollers are adjusted to get a light, even tension on the strips when they are pulled. It is very important that the tension be equal on both ends of the rollers and that low or high spots be compensated for.

(d) *Dampening assembly roller adjustment.* There are only two basic types of dampening assembly roller adjustments—adjustment to the vibrator roller and adjustment to the plate cylinder (fig. 8-35).

1. *Adjustment to vibrator roller.* As was mentioned previously, the vibrator itself is not adjustable and is permanently set in the unit. It is always parallel to the plate cylinder. The two dampener form rollers are set to it or from it, directly or indirectly. Any adjustment made between the vibrator roller and an adjacent roller causes the center points on the axis of each roller to move either toward or away from each other, establishing the pressure between these rollers at adjustment point A. Theoretically, once the pressure ad-

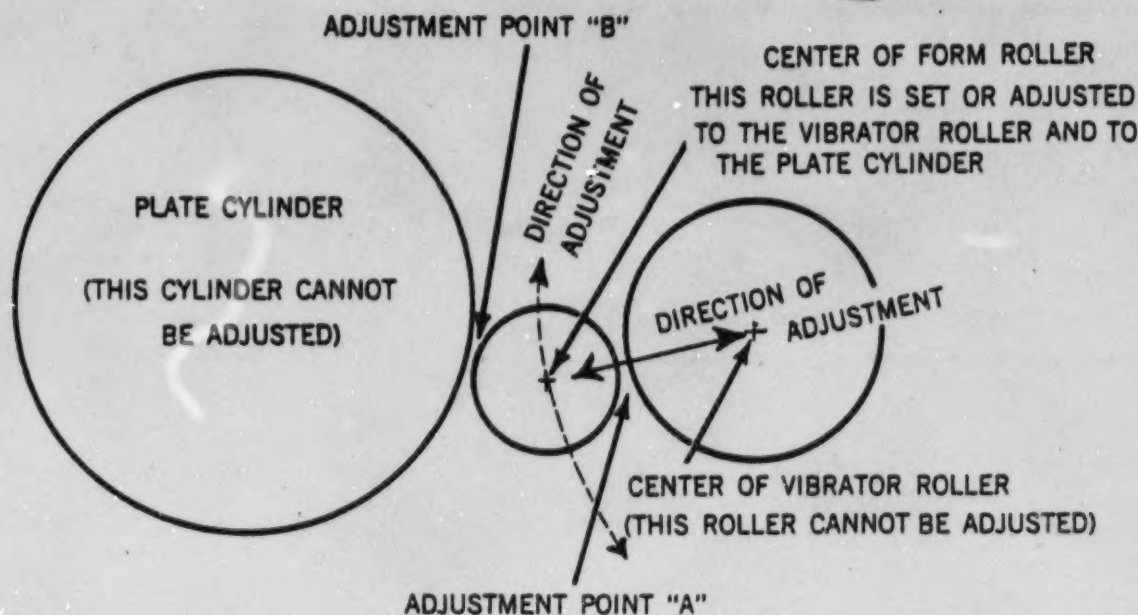


Figure 8-35. Two basic types of roller adjustments.

justment to the vibrator roller has been made, subsequent adjustments (i.e., adjustments to the plate cylinder) should not affect the pressure at adjustment point A, since the distance between the midpoint of the axis of the vibrator roller and the form roller should not change.

2. *Adjustment to plate cylinder.* The other adjustment is used to set the roller to the plate cylinder. This adjustment establishes the correct pressure at adjustment point B in figure 8-35. This adjustment moves the form roller in an arc around the vibrator roller and theoretically should not affect the pressure adjustment already made to it.

(2) Setting dampener form rollers.

(a) General considerations.

1. In spite of the theory mentioned above, the adjustment to the plate cylinder usually affects the adjustment previously made to the vibrator roller. For this reason, constantly check and recheck the adjustments until they become so slight that the adjustment to the plate has a negligible effect upon the adjustment to the vibrator roller. Make certain that the final adjustment is an adjustment to the plate cylinder.

2. Another complicating consideration is that a roller must be set evenly along its entire length, rather than at one point or in cross section as shown in figure 8-35. This necessitates a preliminary or paralleling adjustment to insure that

the roller is not canted when it is set to the base roller. This is an adjustment to the plate cylinder. A roller that is canted can be set so that the "drag" on the feeler strips is the same at both ends, but the pressure near the center of the roller will be excessive and will strain the rollers, and might damage the adjustment mechanism.

3. The rule is to begin setting with the adjustment to the plate (to parallel), then alternate from adjustment to the vibrator to adjustment to the plate, making a finer adjustment each time. The last adjustment must be to the plate cylinder.

(b) *Adjusting the top form roller.* The top form roller is set first. It is placed in the top brackets and secured by holddowns (if that particular press is equipped with them).

1. *Setting to the vibrator.* Feeler strips are inserted between the form roller and the vibrator roller approximately 2 inches in from each end of the roller. Adjustments are made to the vibrator roller by using the screw marked B (fig. 8-36). Turning the screw clockwise decreases the pressure between the vibrator roller and the form roller. Turning the screw counterclockwise increases the pressure between the vibrator roller and the form roller.

2. *Setting to the plate.* Feeler strips are inserted between the form roller and the plate cylinder approximately 2 inches from each end of the

roller. The dampening assembly is moved to the number 1 position (fig. 8-32) by using the water motion throw-off handle. Adjustments are made to the plate cylinder by using the square-headed bolts marked D (fig. 8-36). Turning the bolts clockwise decreases the pressure to the plate cylinder while turning counterclockwise increases the pressure between the form roller to the plate.

3. The top form roller is removed to insure accurate adjustment.

(c) *Adjusting the bottom form roller.* The bottom form roller is placed in its brackets and secured by the holddowns. It is set exactly in the same manner as the top form roller.

1. *Setting to the vibrator.* Feeler strips are inserted between the form rollers and the vibrator roller approximately 2 inches from each end of the roller. Adjustments are made to the vibrator roller with the screw A (fig. 8-37). The adjustment is turned clockwise to decrease the pressure and counterclockwise to increase the pressure between the form roller and the vibrator roller.

2. *Setting to the plate.* The dampening assembly is moved into the Number 1 position (fig. 8-32), by using the water motion throw-off

handle. Feeler strips are inserted between the form roller and the plate cylinder approximately two inches from each end of the roller. Adjustments are made to the plate cylinder by turning the square headed bolts C (fig. 8-37). Turning the bolts clockwise decreases the pressure to the plate cylinder while turning counterclockwise increases the pressure between the form and the plate.

(3) *Setting fountain roller.* The next roller to be adjusted is the fountain roller. Turn the press until the ductor roller activating mechanism is on the high point of its activating cam (ductor roller against the fountain roller when the water-on lever is "on"). Then set the fountain roller to properly contact the ductor roller. The paper feeler strips may be positioned easily by raising the water-on lever, inserting the strips and then dropping the water-on lever to its original "on" position. Make the adjustment by loosening the hexagonal bolts on the fountain roller brackets, F (fig. 8-39), moving the brackets by hand until the fountain roller is parallel to the ductor roller, and then retightening the bolts. The bracket on the gear side of the fountain roller can be moved very little because of the binding action of the fountain roller driving gear. Thus, the only practical adjustment for the fountain roller is the bracket on the

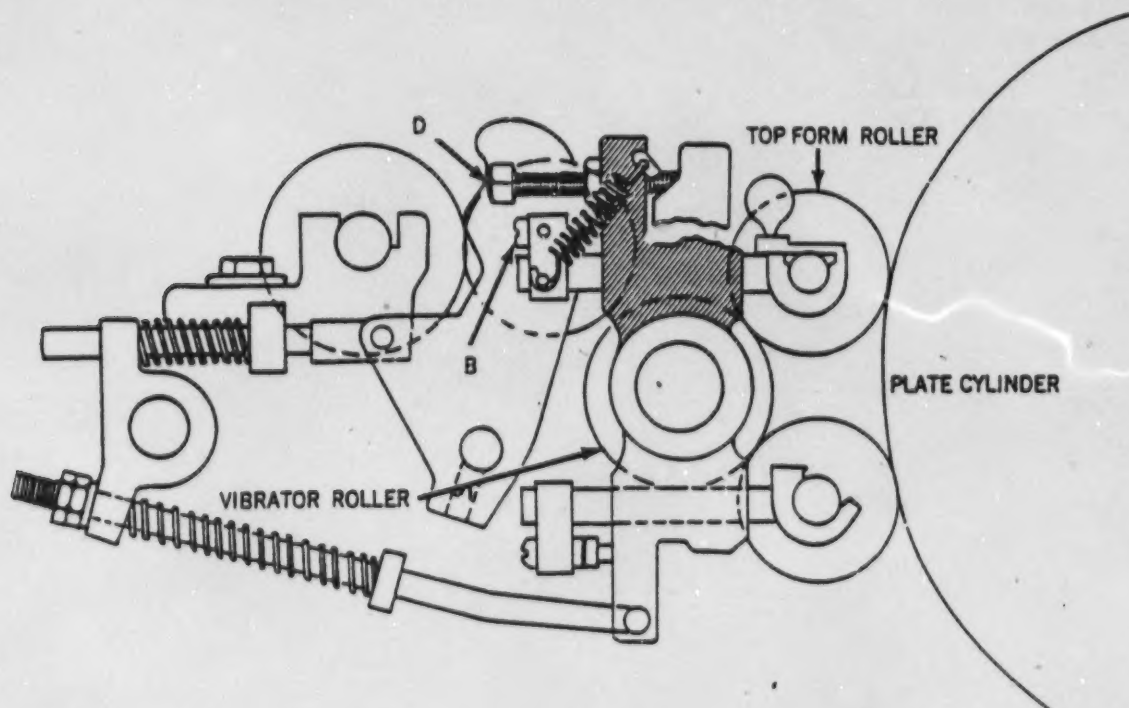


Figure 8-36. Setting and adjusting top form roller (dampening assembly).

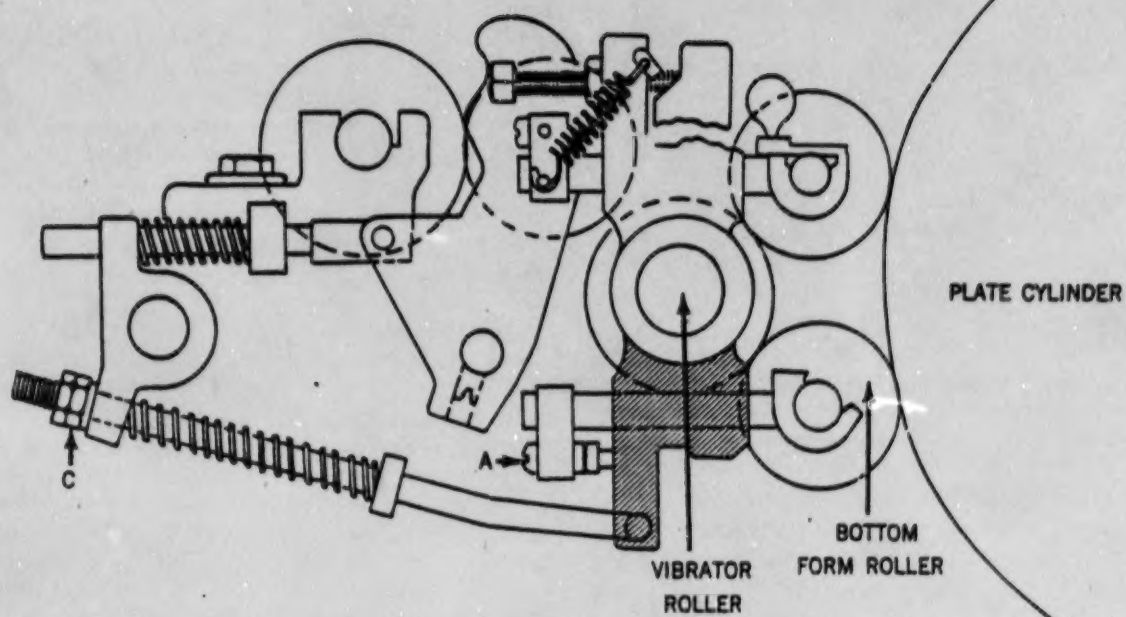


Figure 8-37. Setting and adjusting bottom form roller (dampening assembly).

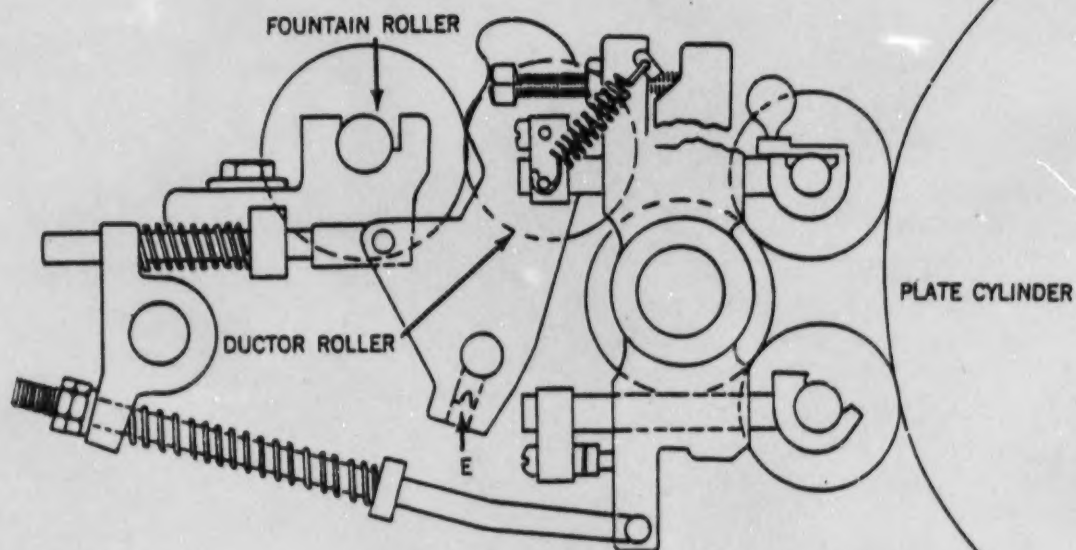


Figure 8-38. Setting and adjusting ductor roller (dampening assembly).

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operator's side. This adjustment is used only to parallel the fountain roller to the ductor roller. If the pressure is incorrect, the adjustment described in the following paragraph must be made.

(4) *Setting ductor roller.*

(a) The next roller to be adjusted is the ductor roller. It is set to the vibrator roller. It must be set while its activating mechanism is on the low point of its activating cam (rolling against the vibrator roller when the water-on lever is "on"). The ductor roller may be lifted up slightly to insert the paper feeler strips. Make the adjustment by loosening the allen setscrew E (fig. 8-38) in the roller bracket on the operator's side, moving that bracket by hand so that the ductor roller is parallel to the vibrator roller, and then retightening the allen setscrew. Note that the allen setscrew is only a lock, and that the actual adjustment is made by hand.

(b) *Important!* Although there are allen setscrews on both brackets, *loosen only the bracket on the operator's side* to make the adjustment, since loosening the gear side bracket allows the entire mechanism which activates the ductor roller to slip out of adjustment. *The gear side*

bracket shall be loosened only by a press erector or senior pressman.

(c) Note, also, that this adjustment is used only to parallel the ductor roller to the vibrator roller and not to adjust the pressure. *If the pressure is excessive, tight, or loose, a press erector or senior pressman makes the adjustment.* (This adjustment consists of turning the press by hand until the ductor roller activating cam is at its lowest point, loosening the allen setscrews in both brackets, adjusting the ductor roller manually until it has sufficient pressure against the vibrator roller across its entire length, and retightening both allen setscrews. This usually necessitates readjusting the ductor roller to the fountain roller as described in (5) below.)

(5) *Setting ductor roller to fountain roller.* In rare instances, the ductor roller will have improper pressure against the fountain roller, despite the fact that the fountain roller is forward to the limit of its adjustment. This can be corrected by using the adjustment on the gear side of the assembly. This adjustment regulates the degree to which the ductor roller shaft will be turned by its activating cam. *Such an adjustment shall be made only by a press erector or senior pressman.*

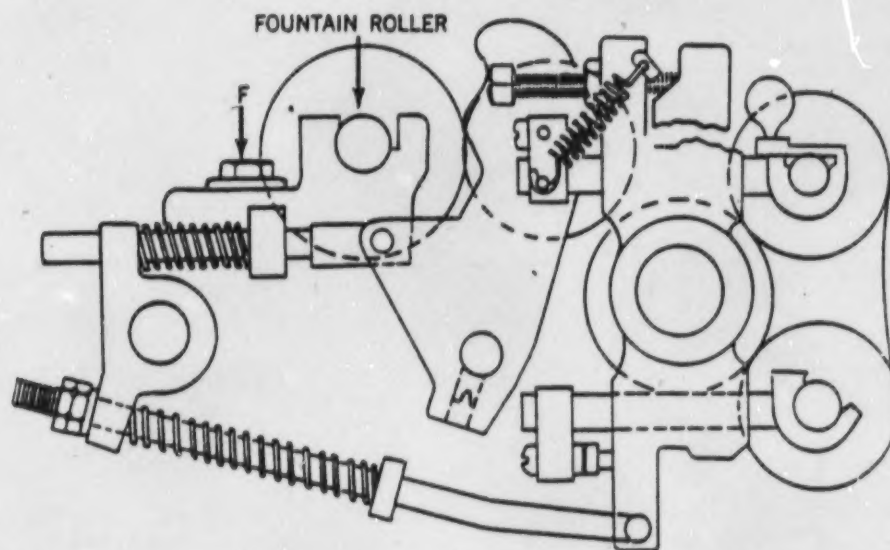


Figure 8-39. Setting and adjusting the fountain roller.

8-20. Fountain Solution and pH Control

a. *Reason for Special Fountain Solution.* The fountain solution has been defined functionally in the nomenclature paragraph at the beginning of this section as a slightly acid liquid, mostly water, used to dampen the nonprinting areas of the plate so that they will repel the greasy ink when the plate is inked. This mutual repulsion of ink and water is the underlying principle of lithography. Plain water, however, is not adequate for the practical application of the principle, so fountain solution has been developed. Water alone tends to swell and break down the image on the plate and also tends to emulsify the ink. Fountain solution, when properly prepared, keeps the plate from accepting ink in the nonprinting areas and at the same time preserves the image for a maximum number of impressions. Proper acidity of the solution used reduces the image swelling and the tendency for ink to emulsify. Too much acid attacks the grain on the plate and undermines the image. When grained plates are used, acid reduces the size of the grain which holds the solution.

b. *Fountain Solution Formula.* Commercially prepared fountain solution may be used if available. The following formula, used at the U.S. Army Engineer School, should be used if the commercial solution is not available:

Plate etch— $\frac{1}{2}$ oz (see app C for the formula for plate etch).

Gum arabic— $\frac{1}{2}$ oz (see app C for the formula for gum arabic).

Water to make—1 gal.

c. *Acidity of Fountain Solution. pH Values.*

(1) The fountain solution should have a certain amount of acid in its makeup. The amount of acid and the effect of varying amounts of acid are important. Plain water has proven unsatisfactory because of resulting problems with scumming of the plate, emulsification of the ink, and weakening of the image itself. The addition of a proper amount of acid reduces these difficulties; however, too much acid causes other troubles.

(2) Too much acid tends to attack the plate in two ways. First, the diazo image is undermined, resulting eventually in a partial or complete loss of the printing areas. Second, the grain, if the plate has a mechanically grained surface, is worn down much more rapidly than usual, and an overall sensitizing of the nonprinting areas occurs. This eventually causes background tinting. Thus, it is obvious that some method of determining acidity and keeping it constant is necessary. A

method developed by chemists and simplified for everyday use gives the acid content a numerical value preceded by the symbol pH, which means "potential Hydrogen."

(3) The pH value is a measure of the degree of acidity or alkalinity of a solution. It is expressed in numbers ranging from 0 to 14, a pH of 7 representing a neutral solution (for example, chemically pure water). As the pH increases above 7, the alkalinity increases; as it decreases below 7, the acidity increases. Therefore, a pH of 0 represents the strongest possible acid and a pH of 14 represents the strongest possible alkali. The proper pH for fountain solution to be used with aluminum plates is 4.6.

(4) There are several ways of determining the actual pH of a given solution, so that any required additions of either acid or alkali can be made to bring it to the optimum of 4.6.

(a) For everyday and field use, the most reliable and simplest instrument to use is the pocket comparator, which is a colorimetric method. In practice, a measured portion of the fluid to be tested is poured into a vial. A measured portion of a chemical indicator or dye is then added from a graduated dropper. The resultant colored solution is then placed in the comparator and is color matched to one of several standard colors. The pH of the solution can then be read from a dial. This method is not so accurate as the electrometric method, but is much simpler and handier.

(b) Another colorimetric method, even faster and simpler than that above, is available, but is not accurate, and gives only an approximate pH value. It is a strip of paper which changes color when brought into contact with acid or alkaline solutions. It is essentially a litmus paper. One brand, called Alkacid Test Ribbon, is immersed in the solution to be tested until it changes color. Its color is then compared to a standard color chart.

(c) If the fountain solution were mixed and found to have a value of 3.0, it would be necessary to add water until the pH changed to 4.6. Likewise, if the pH value were 4.8, a little more acid (phosphoric acid) would be added.

(d) Difficulties may arise in mixing the component ingredients of the fountain solution to exactly the same strength. The formula for fountain solution may have to be changed to suit the circumstances. For example, if a new batch of plate etch gives a pH value of 3.2 when the regular formula for fountain solution is used, the pH

should be adjusted by the addition of water and less acid used the next time the plate etch is mixed.

8-21. Care and Cleaning of Dampening Assembly Rollers

a. Cleaning Metal Rollers.

(1) Many troubles in printing with the lithographic press arise from dirty rollers in the dampening assembly. When the metal rollers in the assembly become coated with ink, they cannot carry the dampening fluid properly. This often causes dry streaks on the plate, resulting, in turn, in scumming. Oxidation of the metal surfaces can also prevent the rollers from carrying the fountain solution properly.

(2) To clean rollers that have picked up ink on their surfaces, remove the fabric covered rollers from the assembly. Clean off the ink with an ink solvent. Then scrub the metal surfaces thoroughly with a mixture of plate etch and pumice powder to increase their affinity for the fountain solution.

(3) To clean rollers that have oxidized, the last step used in (2) above is employed. Sufficient rubbing with pumice powder will take care of even the most serious oxidation. Alternately, a good grade of metal polish, followed by washing with plate etch, will do the job very well.

(4) Once the metal rollers have been cleaned, it is good practice to apply a thin coat of gum arabic. This coating serves to prevent oxidation. At least one cleaning and one coating of gum arabic per day should be standard procedure when operating the press.

b. Cleaning Fabric Covered Rollers.

(1) Just as dirty metal rollers will not carry the fountain solution properly, the fabric-covered rollers also will not carry solution when the fabric is saturated with ink or grease. This condition is more serious with the fabric covered rollers than with the metal rollers because the ink not only prevents the transfer of dampening fluid, but also tends to be redeposited on the plate. The tendency to scum is therefore much greater if the rollers are dirty.

(2) The fabric-covered rollers may be cleaned in several ways, the most common being with a stiff-bristled brush and plain water. If the rollers are extremely dirty, soap or one of several commercial cleaning preparations may be used. Care should be taken to rinse the rollers thoroughly.

Occasionally, an ink solvent may be employed to help remove the ink, again rinsing thoroughly to remove all traces of the solvent. Following any scrubbing, the rollers must be scraped with the edge of an ink knife to remove any excess water and loosened dirt.

(3) The rollers are placed in a rack parallel to the floor and allowed to dry before reuse. Particular care must be taken that the fabric surfaces are not allowed to come in contact with any object which could cause depressions or flat spots.

c. *Recovering Fabric Covered Rollers.* Any fabric-covered roller that has many high or low spots, which has no nap left on the fabric, or which is extremely dirty even after scrubbing, should be recovered. This operation is quite simple, the procedure being as follows:

(1) Remove the old covering by cutting along the seam with a razor blade. Take care not to cut into the cover beneath.

(2) Check the undercovers to be sure that they are fairly clean and have no high or low spots. Unsatisfactory undercovers must be replaced. The method used is identical to that outlined below.

(a) Guide the larger end of the new cover (the end toward which the arrow, if present, is pointing) over one end of the roller and work it down until it overlaps the opposite end of the undercover by approximately $\frac{1}{4}$ inch.

(b) Tie a double strand of waxed string

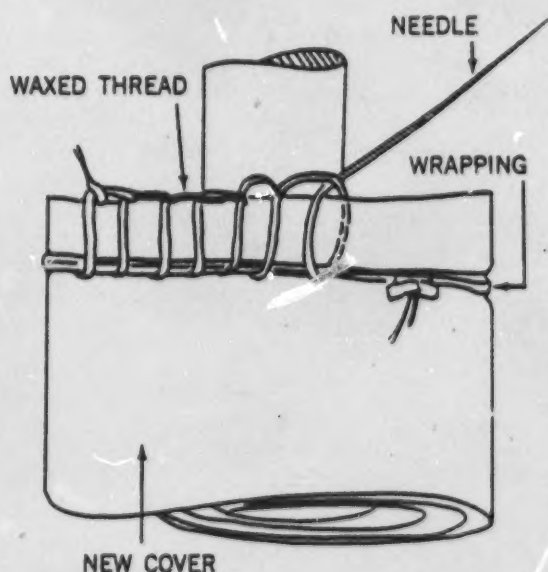


Figure 8-40. Recovering fabric rollers.

around the end of the roller, just over the undercover.

(c) With a needle and waxed string, take a saddle stitch around the end of the new cover with a half hitch through each loop, as shown in figure 8-40. Each stitch encloses the waxed string previously tied around the end of the roller, but it must not go through the fabric underneath.

(d) Pull the double string tight and tie its ends to the ends of the stitching string.

(e) Then draw the cover toward the end opposite to that which has been sewn until the cover is tight and smooth.

(f) Cut off the excess fabric with a razor blade $\frac{1}{4}$ inch beyond the end of the undercover.

(g) Again tie a double weight of waxed string around the end of the roller, just over the end of the undercover.

(h) Then sew the end in the same manner as the other end.

Section VII. INKING ASSEMBLY

8-22. Introduction

The inking assembly, consisting of an ink fountain, a ductor roller, vibrator rollers, intermediate rollers, and form rollers, transfers the ink uniformly to the plate as the plate cylinder revolves. This action follows the dampening of the plate. The ink clings to the image portion of the plate and is repelled by the dampened nonprinting areas. Figure 8-41 illustrates schematically the inking assembly of the ATF Model DP press.

8-23. Additional Nomenclature

Part	Function
Ink fountain -----	Used to hold the ink which is to be distributed through the inking assembly rollers to the plate. The feeding of the ink to the rollers is controlled by the fountain roller, the fountain blade, and the fountain keys (fig. 8-41).
Fountain roller -----	As it revolves, the fountain roller picks up the ink and transfers it to the ductor roller (fig. 8-41).
Fountain roller manual handle.	Used to turn the roller by hand when adding ink, setting the fountain keys, or washing up (not illustrated).
Fountain blade -----	Positioned in front of the fountain roller so as to form a trough for the ink supply. The size of the gap between it and the roller controls the amount of ink fed to the inking assembly rollers (fig. 8-41).
Fountain keys -----	Used to regulate the gap between the fountain blade and roller. Tightening the keys (turning them clockwise) closes the gap and decreases the flow of ink. They are not used to control the overall flow of ink. Each

Part	Function
Automatic ink control unit.	key regulates approximately 1 inch of the gap which makes it easy to adjust for the requirements of different portions of the image on the plate (fig. 8-41). Regulates the part of a revolution the ink fountain roller turns during each operational cycle of the press. The farther the fountain roller turns, the more ink is delivered to the rollers in the inking assembly. The operation of this unit is controlled by the ink control handle and the ink control lever (fig. 8-42 and 8-43).
Ink control handle ---	Regulates, by the height of its setting, the number of teeth the pawl on the automatic ink-control unit engages on the ratchet at the end of the fountain roller. The more teeth the pawl engages, the greater the distance the fountain roller revolves during one cycle of the press (fig. 8-42 and 8-43).
Ink control lever ----	When in its "down" position, this lever permits the ink-control pawl to engage the ink-control ratchet. When the press goes "on impression," the ink-control lever engages automatically. If it is desired to operate the ink-control unit with the press "off impression," the ink-control is manually pulled forward and downward (fig. 8-43).
Ink motion throw-off handle.	Used to control the position of the inking assembly form rollers in relation to the plate. This handle has three positions—"down" or "printing," "up," and "lockup" (fig. 8-28).

Part	Function
Ductor roller -----	Conveys the ink from the fountain roller to the rest of the inking assembly rollers by being in contact with the fountain roller part of the time and then arcing over to touch the adjoining vibrator or intermediate roller the remainder of the time (fig. 8-41).
Intermediate rollers --	Transfer ink from one roller to another. They have their own bearings, do not oscillate, and are surface, or friction, driven (fig. 8-41).
Rider rollers -----	Nonadjustable, nonoscillating rollers sitting above some intermediate rollers (fig. 8-41).
Vibrator rollers -----	Do most of the work of smoothing out and distributing the ink evenly to the form rollers. The vibrator rollers move from side to side along their axes as they rotate (fig. 8-41).
Form rollers -----	Distributes the ink to the plate (fig. 8-41).

8-24. Operational Instructions

a. Adjusting Ink Fountain.

(1) *Turning fountain roller by means of manual handle.* At the end of the fountain roller spindle on the gear-side is a large handle connected to the roller by a pawl and ratchet. By moving this handle forward and backward, the fountain roller can be rotated manually. It is used when adding ink, setting the fountain keys, or washing up.

(2) *Removing and replacing fountain blade.* The fountain blade is locked into place in front of the fountain roller by three bolts. Loosen these three bolts and remove the blade to wash up. The abutment plate rod assembly, under the fountain blade, is also removed for cleaning. This blade is made of flexible spring steel. Avoid binding, buckling, or otherwise damaging it. After the blade and fountain roller have been cleaned, and the abutment plate rod assembly returned, return the blade to its place and tighten the lock bolts.

(3) *Adjusting ink fountain gap by means of fountain keys.* Tightening the keys (turning them clockwise) closes the gap between the blade and the fountain roller and decreases the flow of ink. Loosening the keys (turning them counterclockwise) increases the flow of ink.

b. Setting and Adjusting Automatic Ink Control

Unit. The ink-control unit regulates the part of a revolution the ink fountain roller turns during each operational cycle of the press. The farther the fountain roller turns, the more ink is delivered to the rollers in the inking assembly. To operate the unit on the ATF Model DP press, raise the ink-control handle (fig. 8-42) to the approximate center of its adjustment range. See that the ink-control lever (fig. 3-43) is in its "down" position. Start the press. After examining the amount of ink on the sheets being printed, move the ink-control handle up or down to increase or decrease the overall amount of ink being fed to the inking assembly rollers.

c. Positioning Form Rollers On or Off Plate by Means of Different Setting for Ink Motion Throw-off Handle. In paragraph 8-16d, which covers the operational instructions for mounting a plate on the plate cylinder, reference is made to the ink motion throwoff handle. Figure 8-23 illustrates the three settings for this handle—"down" or "printing," "up," and "lockup." In its "up" position, the form rollers clear the plate by approximately $\frac{1}{8}$ inch. In the "down" or "printing" setting, the form rollers are against the plate and will ink the image on the plate as the plate cylinder revolves. The ink motion throwoff handle is connected to the impression linkage arm and drops or raises automatically when the press impression goes "on" or "off". The handle, however, can be locked in its "up" position so the form rollers will not drop to the plate automatically with the impression mechanism. When the press is not on impression, the handle can be raised or lowered manually.

d. Adjusting Ink Rollers—ATF Model DP.

(1) *Setting form roller 2 to vibrator roller.* Remove the rider roller, the three intermediate rollers, the two removable vibrator rollers, and form rollers 1 and 3. Replace the vibrator roller over form roller 2 and lock it down. Adjust the form roller to the vibrator roller by turning the lower allen setscrew. This screw is similar to and located just below the lower adjusting screw for form roller 3, illustrated in figure 8-44. Turning the screw in a clockwise direction moves the form roller toward the vibrator. This adjustment has no locking device. Check this adjustment with the ink motion throwoff handle in both the "up" and "down" positions.

(2) *Setting form roller 2 to plate.* This adjustment is made with the upper allen setscrew which has a locking nut that fits over the screw. The locking nut must be loosened before any ad-

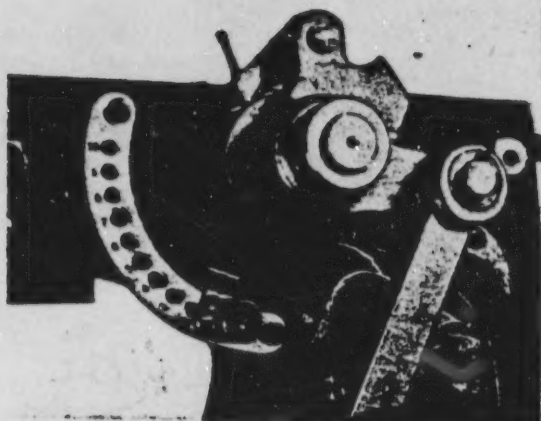


Figure 8-43. Automatic ink control unit—ATF Model DP.

justment can be made. Turning the allen setscrew in a *clockwise* direction moves the form roller away from the plate cylinder. After setting the form roller to the plate cylinder, reset it to the vibrator roller.

(3) *Setting form roller 1 to vibrator roller.* Take out the vibrator roller, remove form roller 2, replace form roller 1, replace the vibrator roller, and lock it down. The adjustment steps are similar to those outlined in the preceding paragraphs for form roller 2. The lower allen setscrew adjusts the form roller to the vibrator. Turning the screw in a *clockwise* direction moves the form roller toward the vibrator roller. This adjustment has no locking device. Check this adjustment with the ink motion throwoff handle in both the "up" and "down" positions.

(4) *Setting form roller 1 to plate cylinder.* The adjustments are the same as those outlined above for form roller 2. After setting the form roller to the plate cylinder, reset it to the vibrator roller.

(5) *Setting form roller 3 to vibrator roller.* Replace form roller 3 and the vibrator roller. The adjustments are the same as for the other two form rollers (fig. 8-44). Turning the lower adjusting screw in a *clockwise* direction moves the form roller toward the vibrator. Turning the screw counterclockwise moves the form roller away from the vibrator. Check this adjustment with the ink motion throwoff handle in both the "up" and "down" positions.

(6) *Setting form roller 3 to plate cylinder.* The adjustments are the same as those outlined above for form roller 2. Turning the upper allen setscrew in a *clockwise* direction moves the form roller away from the plate cylinder. After setting the form roller to the plate cylinder, reset it to the vibrator roller.

(7) *Setting auxiliary vibrator roller.* Set the auxiliary vibrator roller to form roller 3 with the thumbscrew on the end of the roller (fig. 8-45).

(8) *Setting the intermediate rollers.* Set the top intermediate roller to the top vibrator roller with the thumb screw on each end of the roller on the feeder side of the roller assembly (fig. 8-46). Set intermediate roller 2 by varying the spring tension which pulls it into contact with the two stationary vibrator rollers. (Make this adjustment only under the supervision of an experienced press operator because the cast brackets are fragile.)

(9) *Setting ductor roller.* The ductor roller on the ATF Model DP is self-paralleling. Adjust for overall pressure against the fountain roller with an eccentric stud located on the operator's side of the fountain.

e. Care and Cleaning of Ink Rollers.

(1) If rollers are in constant use, remove them and give them a thorough cleaning by hand every two weeks. During a run, ink and gum are gradually deposited on rollers and form a glaze which causes uneven and dirty printing, ghosting and streaks.

(2) When taking the rollers out for cleaning, arrange them so they may be reinstalled in their original order. This reduces the degree of roller adjustment.

(3) Wash with good ink solvent that will not swell rubber. When the ink is removed, mix some pumice in solvent to remove glaze. Clean the ends of the rollers and clean and lubricate the sockets and bearings.

(4) Clean metal rollers the same as rubber except that copper plated rollers are not pumiced.

(5) Store rollers in a cool, dry place out of the sun. Prevent roller surfaces from touching anything and so avoid low or flat spots on the rollers. Put operation buttons on "safe" when cleaning rollers manually.

INK CONTROL HANDLE (PART OF THE
AUTOMATIC INK CONTROL UNIT)

INK CONTROL LEVER

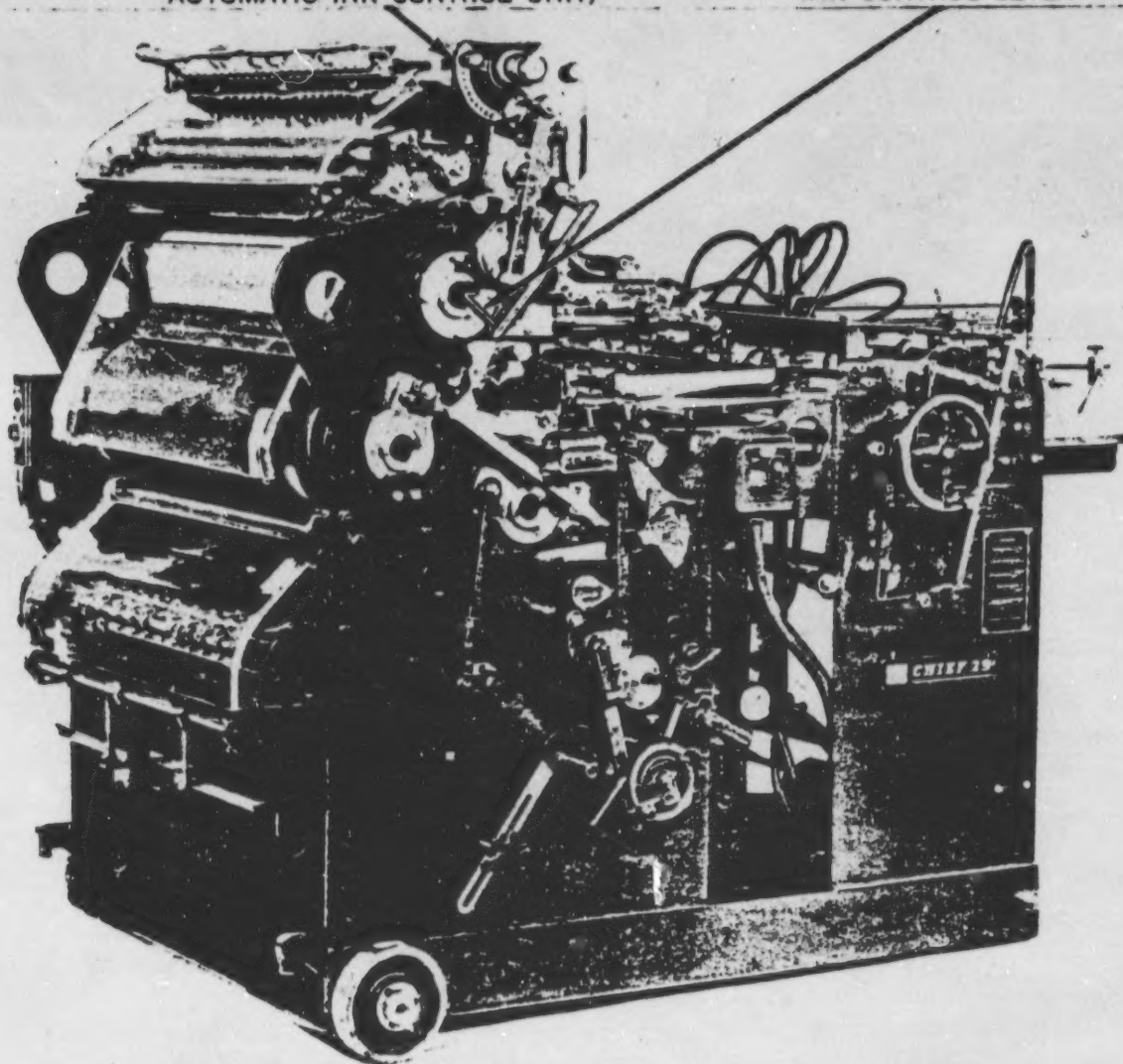


Figure 8-43. Ink control lever and handle—ATF Model DP.

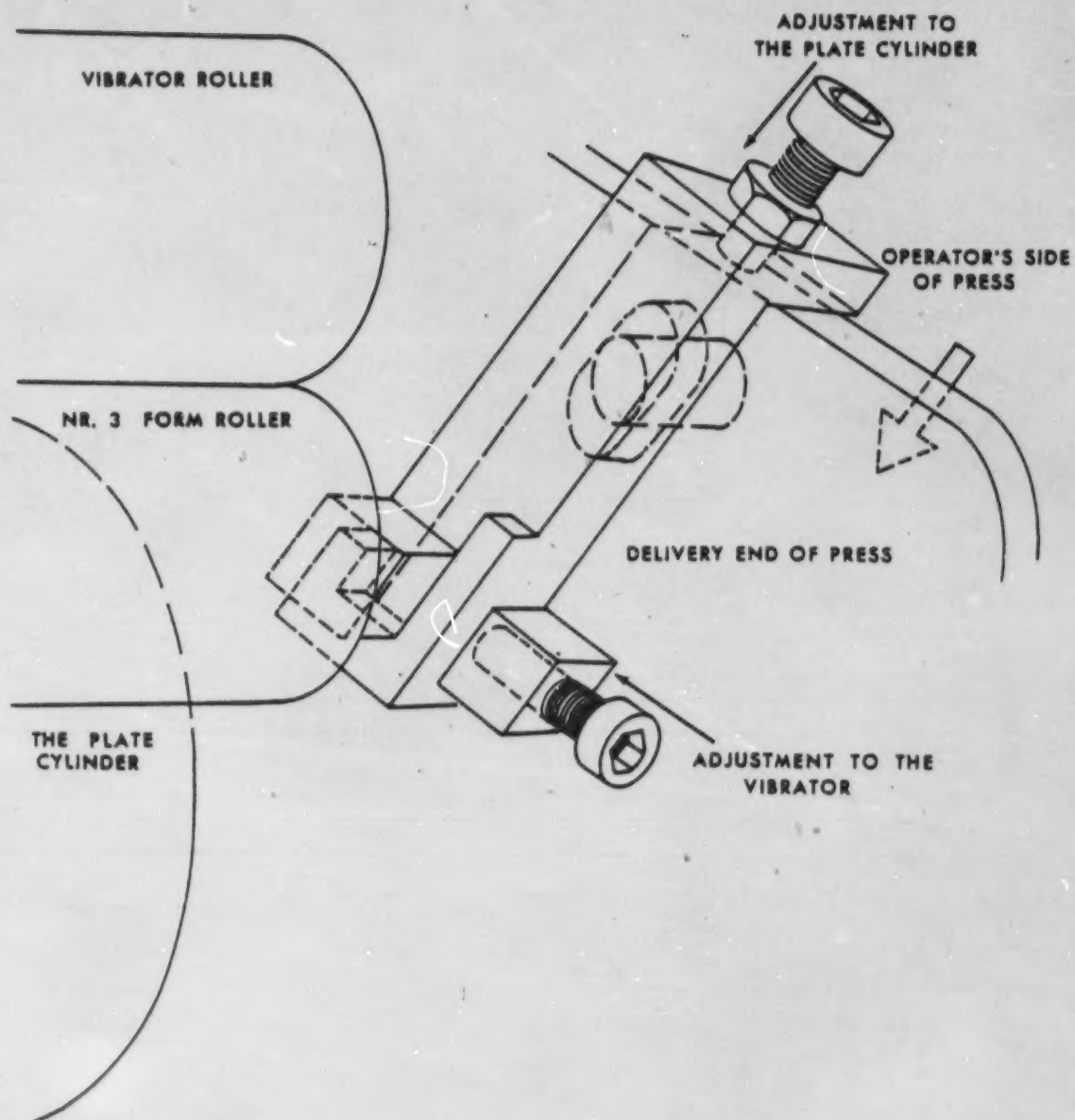


Figure 8-44. Adjustment of form roller 3-ATF Model DP.

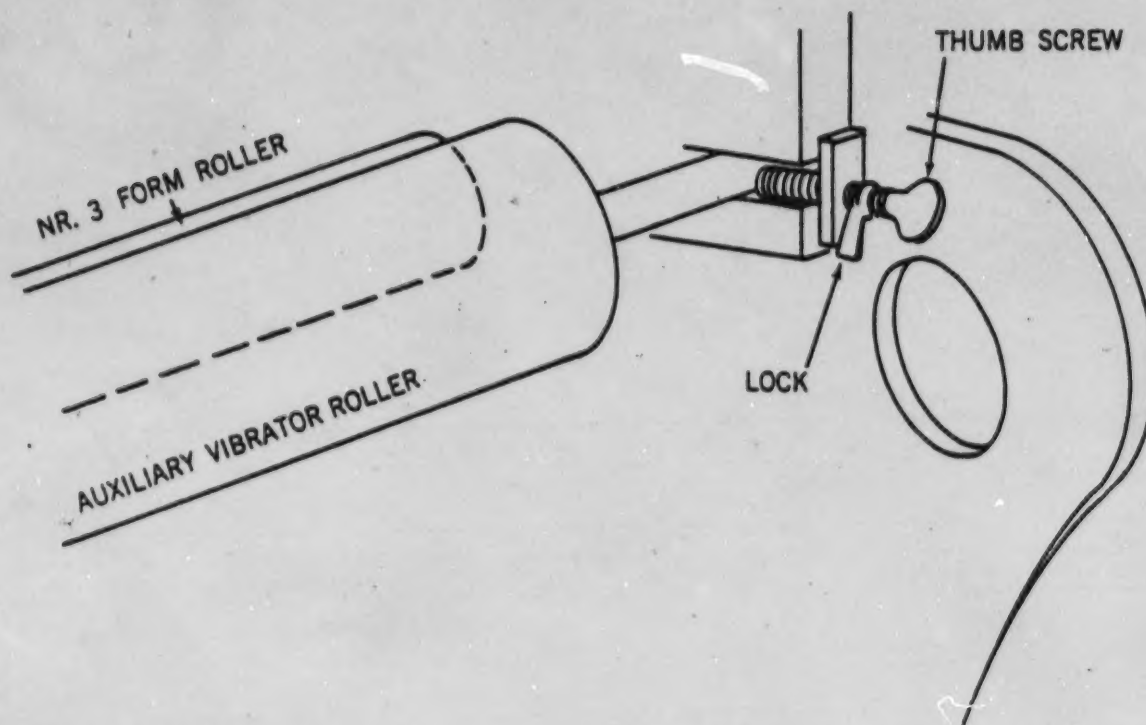
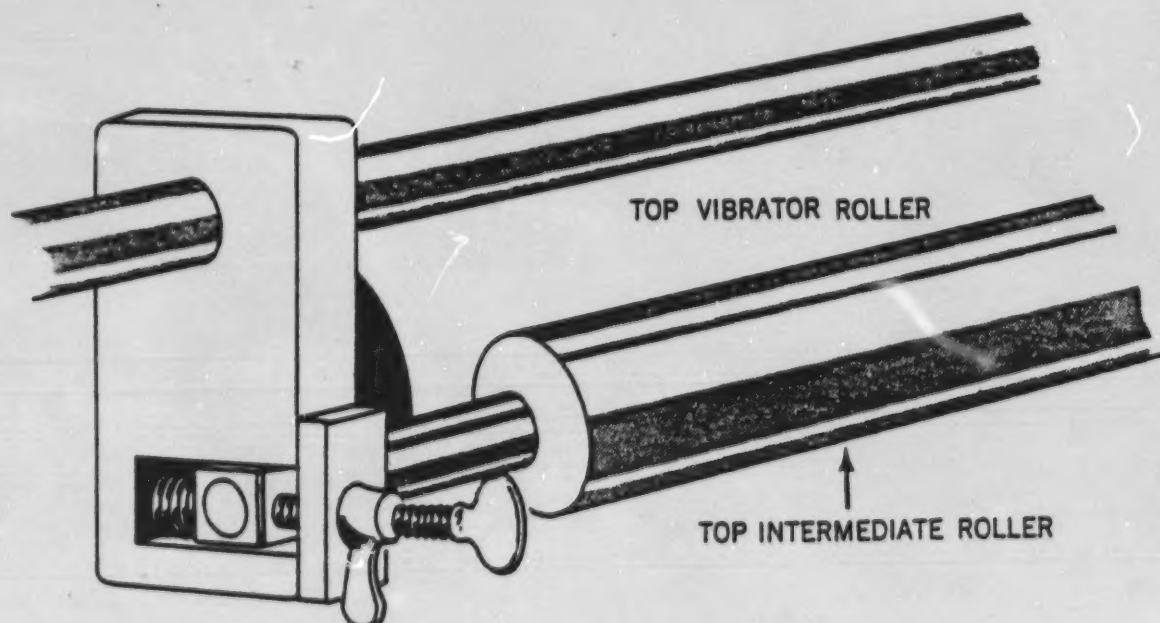


Figure 8-45. Setting auxiliary vibrator roller—ATF Model DP.



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Figure 8-46. Setting top intermediate roller—ATF Model DP.

Section VIII. INK PREPARATION

8-25. Introduction

The ink used in offset printing is a greasy, semi-solid which adheres to the image portion of the plate and is repelled by the dampened, nonprinting portions of the plate. Its basic ingredients are the pigment, a liquid varnish called the "vehicle", and a drier. The pigment provides both the color and the covering quality of the ink. Since an extremely thin film of ink actually reaches the printed sheet, the ink must have a high color density. There must be enough pigment in the ink to completely "cover"; that is, to produce a dense, constant color even in this thin film. The vehicle carries the pigment, and when it dries, binds it to the printed surface. It imparts the greasy quality necessary for inks used in the lithographic process. The drier acts as a regulator to control the drying speed of the vehicle. The ink should dry rapidly enough to avoid smearing the next time the sheets are handled, but it should not dry so rapidly that it dries and cakes on the ink rollers.

8-26. Operational Instructions

a. *Preparing Ink for Use.*

(1) Remove the top from the ink can and, if the can has been opened before, scrape the dried ink skin from the surface of the ink. This is very important. It is better to throw away a little good ink than to allow any bits of dried ink to get on the press and form scales on the plate or paper. When removing ink from the can, leave the surface of the remaining ink smooth and even, and cover it with oiled or waxed paper. This will retard the formation of new surface skin.

(2) Place the ink to be mixed on a glass or metal slab and, using an ink knife or spatula, work the ink around with a rolling motion until it is possible to judge its consistency. An experienced pressman can tell from the "look" and "feel" of the ink how it is likely to behave on the press. An approximate idea of the consistency of the ink can be obtained by lifting the spatula from the slab and watching to see how high it can be raised above the slab before the strings of sticky ink break. If they break immediately, the ink is too thin. If the spatula can be raised approximately 8 inches before the strings of sticky ink break, then the ink may have the proper consistency. If no strings form at all and all the ink remains on the spatula, it is too thick.

(3) The preparation of the ink might be as

simple a job as opening a new can of ink, dipping some out onto the mixing slab, working it with a spatula, and transferring it from the slab into the ink fountain. However, this represents an ideal situation and many complicating factors may enter into the procedure. The ink may be too stiff and dry even in a freshly opened can. It may be too thin and fluid. The paper stock may have a glossy surface which will prevent the ink from being absorbed into the paper. This will slow the drying time. After the sheets are printed on one side, they may have to be printed on the other side shortly thereafter and the ink may be too slow drying. Other complicating factors are the number of colors to be run, the type of image—whether halftone or line, and the temperature and humidity.

b. *Modifying or Altering Ink With Additives.* Most offset inks acquired through supply channels are ready for use under average conditions and need not be doctored with other ingredients. However, although it is desirable to use offset inks as concentrated and unreduced as possible, it is sometimes necessary to modify them to achieve certain results. Listed below are several types of additives or "doctors" used to modify the ink.

(1) *Varnishes.* Varnishes are of the best grade of boiled linseed oil, which give optimum drying qualities. The varnishes may be obtained in various viscosities or thicknesses, available in #00000, #0000, #000, #00, #0, #1, #2, #3, #4, #5, #6, #7, and #8. The zero-numbered varnishes thin the ink, while numbers 1 through 8 thicken the ink and add to its cohesiveness. The standard army issues are #00 and #8 varnishes. These two varnishes are sufficient to alter the ink to almost any desired consistency. However, the use of too much varnish is apt to make the ink too greasy, causing poor printing results.

(2) *Cobalt or liquid dryer.* Dryer is an agent that hastens the drying of printed ink on paper. Cobalt dryer is fast acting and should be used sparingly, never more than an ounce to a pound of ink. Any more than this does not increase the speed of drying on the paper to any appreciable extent, but greatly increases the speed of drying on the ink rollers. Cobalt dryer hastens the reaction of the ink with air, and may be said to dry "from the top down."

(3) *Paste dryer.* Paste dryer acts more slowly than cobalt dryer. However, no more than 1½ ounces should be used to a pound of ink. Paste

dryer hastens the setting or absorption of the ink into the paper. It may be said to dry "from the paper up."

(4) *Magnesia powder* (*magnesium carbonate*). Magnesia powder is sometimes mixed into thin or soupy inks to stiffen them and to cut down their greasiness.

(5) *Other "doctors."* There are a great many other materials that can be added to inks to alter their performance. Only experience can develop this skill. In general, all "doctors" reduce the strength and depth of an ink's color, affect the tack and viscosity, and either hasten or retard drying. Some inks require careful handling in order to print properly, and, therefore, the use of "doctors" should be avoided whenever possible.

c. *Mixing Color Pigments.* In topographic reproduction units, standard printing colors, identified by TOPOCOM nomenclature, are specified for mapping projects, and are furnished through normal supply channels. In other military printing units, however, the pressman may be expected to mix many needed colors from a few basic pigments. A knowledge of primary colors and the results of their combinations is thus necessary for color printing.

(1) *Pigment colors.* Briefly, red, yellow, and blue are the three primary pigment colors, as dis-

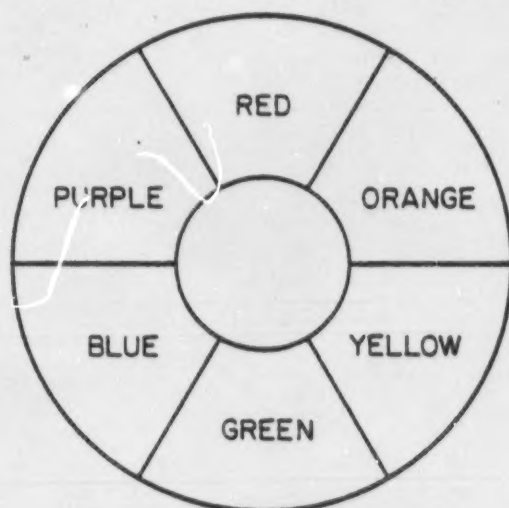


Figure 8-47. Color wheel (pigments).

tinguished from the additive primary colors of the light spectrum discussed in paragraph 5-13 above. Any other color can, theoretically, be obtained by mixing these three primary colors in the proper proportions. A color wheel or chart showing the colors and their various combinations is very helpful in this connection (fig. 8-47). Colors that are opposite each other on the color wheel are called *complementary* colors. Mixing any two primary colors creates a color that is complementary to the third primary color. When printed together, such complementary colors usually create harmonious combinations, but if mixed together as pigments, they usually form a shade of gray. A study of the color wheel provides the explanation: mixing any color with its complement is equivalent to mixing the three primary colors together. If the strengths of the three colors are equal, the result is always a neutral gray pigment.

(2) *Amounts of color.* When mixing a color from two or more colors, it is best to start with the lightest color and add the darker ones to it, a little at a time, until the desired result is obtained. This is not only the easiest method, but also the most practical. Other methods usually result in mixing more ink than is necessary.

(3) *Materials for mixing tints.* There are three materials which can be used for reducing color strength or tint making.

(a) *Opaque white.* Opaque white gives a color a milky appearance and helps to cover colored stocks or previously printed colors. No more than 10 percent should be used in any mixture, as it gives poor results on a lithographic press.

(b) *Reducing white.* Reducing or transparent white (also known as alumina hydrate) is best for mixing tints that are to be run with small or fine images on offset or hard surfaced papers.

(c) *Laketins.* Laketine is best for mixing tints that are to be run with solids on coated stock. Reducing white and laketine may be mixed to achieve desired results when using certain images and stocks.

d. *Handling Ink.* When the ink is properly prepared, pick it up from the mixing slab with a spatula and carry it to the ink fountain of the press. Turning the spatula continuously prevents the ink from falling off.

Section IX. MAKEREADY

8-27. Introduction

When preparing to print a job, the pressman first reads his work order, and then procures the proper plates, paper stock, and ink, and has all other necessary materials on hand. Then he sets up the feeder and delivery assemblies, packs the cylinders, and prepares the inking and dampening assemblies. Next, the plate is inked up, waste sheets are printed, position and color are checked and corrected, and an OK obtained from the supervisor or senior pressman. All of the preceding steps comprise what is known as the makeready procedure.

8-28. Operational Instructions

a. *Collecting Required Materials.* In addition to the tools provided with the press, the pressman must have many other materials on hand. Among these are: a bowl or pail, an ink solvent for use on rubber rollers and blankets, turpentine or a similar solvent to be used on the plate, gum arabic, plate etch, asphaltum, pumice powder, a half-and-half mixture of talcum powder and flowers of sulfur, a soft eraser, several etching needles, a quantity of rags, and a sponge. Check manufacturer's instructions, as turpentine and asphaltum are harmful to some plates.

(1) *Ink solvent for rubber.* The ink solvent for the rubber rollers and blankets should be one that has little or no detrimental effect on rubber. This is usually naphtha, or any one of a number of commercial preparations made especially for this purpose. Under no circumstances should gasoline, carbon tetrachloride, turpentine, kerosene, or any mineral oils be used.

(2) *Ink solvent for plate.* The ink solvent for use on the plate is usually turpentine. Other commercial preparations may be used for the same purpose.

(3) *Gum arabic (acacia).* Gum arabic is pitch taken from the acacia tree. It is soluble only in water. It is used as a protective coating on the nonprinting areas of the plate. It is also used in the fountain solution. Gum arabic is applied to the plate whenever the press is stopped for a period of time. It is applied with a sponge, smoothed with a damp rag, and removed from the plate with a sponge saturated with water.

(4) *Plate etch.* Plate etch is a solution, containing one or more acids, used to make the nonprinting areas receptive to water. It can cause

skin irritation if proper precautions are not taken. Plate etch is applied to a plate and removed with a sponge.

(5) *Asphaltum.* Asphaltum is a thick, greasy liquid. Because it never dries to a really solid form, it is used to protect the image areas of a plate that is to be stored for a considerable length of time. It is also used to restore ink receptiveness to an image that has become weak. It is soluble in turpentine.

(6) *Pumice powder.* Pumice powder is a fine abrasive. It may be used to scour the blanket, to grind a new grain into small areas of the plate, or as a scouring powder on almost any surface. Pumice powder is applied to a plate with a rag dampened with either water or plate etch. It is removed with a rag saturated in water. The plate must be etched with plate etch after using pumice.

(7) *Talcum-sulfur powder (blanket dust).* The talcum powder and flowers of sulfur mixture is used to preserve and revive the tackiness of rubber blankets.

(8) *Soft eraser.* A soft eraser is used to remove unwanted work from presensitized and wipe-on plates.

(9) *Etching needles.* Etching needles are used to add or delete fine work from the plate.

b. *Job Work Order.* Each job should be accompanied by a work order giving pertinent information concerning the job, such as the color of ink, the type of stock to be used, the number of sheets required, the number of plates, and the completion date.

c. *Setting Feeder and Delivery Assemblies.* Adjust the feeder and delivery assemblies to the size and weight of stock to be used (see para 8-8 to 8-13 for detailed instructions covering these adjustments).

NOTE

Safe switches must always be in the "safe" position when setting the feeder and delivery assemblies.

d. *Mounting Plate (and Blanket).* Mount the plate and, if necessary, the blanket on their respective cylinders. Usually the blanket is already mounted, and the pressman need concern himself only with mounting the plate (see para 8-14 to 8-16 for detailed instructions covering the mounting of the plate and blanket).

NOTE

Safe switches must always be in the "safe" position when mounting either the plate or the blanket.

e. Preparing Inking Assembly. Check all adjustments of the ink rollers (see para 8-22 to 8-24 for detailed instructions covering the ink roller adjustment).

NOTE

Safe switches must always be in the "safe" position when adjusting the inking assembly rollers.

Mix the ink according to the work order specifications. Tighten all the ink fountain keys by turning them clockwise and then back them off $\frac{1}{8}$ turn. Turn the press until the ink ductor roller contacts the fountain roller. Then place the ink in the fountain. Adjust the fountain keys while turning the fountain roller, with the ductor roller contacting it, and observe the distribution of ink on the ductor and fountain rollers. Adjust the fountain keys so that they will distribute the ink according to the requirements of the plate.

f. Preparing Dampening Assembly. Check all adjustments of the dampening assembly rollers (see para 8-17 to 8-21 for detailed instructions covering these adjustments).

NOTE

Safe switches must always be in the "safe" position when adjusting the dampening assembly.

Mix gum arabic, acid, and water to make a fountain solution of the proper pH and fill the fountain.

g. Inking Plate.

(1) Put the dampening assembly in position 2 (para 8-19a), lower the water-on lever, and engage the ink-control handle and lever. Before starting the press, check to see that it is clean. Then start the press and allow it to idle until the dampening rollers are wet, but not soaking, and the ink rollers are carrying a sufficient film of ink.

(2) Then sponge the plate with water to remove the protective gum arabic coating and start the press. Since the developing ink in the image areas of a new plate may have dried, it is best to first drop the ink rollers so that the image will be charged with fresh ink, then move the dampening assembly to position 1. This will prevent the acid

in the fountain solution from attacking the image. After subsequent wetwashes, however, the dampening rollers must be contact the plate first to remove excess water. After several press revolutions, raise the ink rollers, put the dampening assembly in position 2, stop the press, and examine the plate for proper inking. Sponge the plate with water to prevent it from drying out and oxidizing. If the image on the plate does not take ink properly, it must be made to do so before proceeding. Among the many causes of this difficulty, called a "blind image", are—improperly set ink rollers, glazed ink rollers, improperly set ink fountain, or gum streaks or spots.

h. Printing First Sheets.

(1) In order to print sheets for checking position and color, start the press and put the dampening assembly in position 1. Check the plate for dampness and lower the ink rollers against the plate. This is a good habit to cultivate, as it not only decreases the possibility of accidentally "rolling up" the plate, but also increases the quality of the first few sheets.

(2) Print three to five sheets by starting the air pump, raising the feeder valve, pushing the impression-on lever down, as the first sheet reaches the front guides, and turning the air pump off immediately afterward.

(3) Then stop the press, put the dampeners in position 2, and sponge the plate with water.

i. Checking and Correcting Image Transfer.

(1) Examine the printed sheets to check the transfer of the image from the plate to the blanket to the paper. All of the image on the plate must reach the paper.

(2) If the image does not transfer properly, it must be made to do so before proceeding. Among the many causes for this difficulty are: an insufficient blanket packing and a dented or cut blanket.

(3) Lower the ink rollers to the gummed plate while the press is idling (off impression). Since the plate is dry, its entire surface will accept ink. Then put the press on impression for two or three revolutions (with the impression cylinder backed off), transferring the ink to the blanket. All smashed or dented areas will not accept ink and can now be marked for additional localized packing. After correcting this condition, clean the plate and blanket.

j. Checking and Correcting Position.

(1) Examine the printed sheets to check the

position of the printed image on the sheet. The image is positioned on the sheet in two directions—parallel to and a certain distance away from the gripper edge of the sheet, and centered side to side (inside the long dimension) on the sheet. There are several ways of checking the position of the image by tearing or folding the printed sheet. Corner marks on the plate are used to aid in positioning. The image can be straightened on the sheet by twisting the plate to a different position on the plate cylinder. The maximum amount that the plate can be twisted is approximately $\frac{1}{8}$ inch. (Para 8-16g gives full instructions for twisting the plate.)

(2) The amount of gripper margin can be changed by swinging the plate cylinder to a different position in relation to the blanket cylinder. The maximum plate cylinder swing is $1\frac{1}{2}$ inches ($\frac{3}{4}$ in. either way from the center point). (Para 8-16g gives full instructions for swinging the plate.) The amount of gripper margin can also be changed by back-and-forth adjustment of the front guide bar to allow the sheet to be gripped in a different position on the impression cylinder. One full turn of the horizontal front guide bar screw equals approximately $\frac{3}{64}$ inch change in gripper margin. The maximum change in gripper margin, by moving the front guide bar, is approximately $\frac{3}{16}$ inch ($\frac{3}{32}$ in. either way from the center point). The registration wheels must be reset to the tail edge of the sheet after moving the front guide bar.

(3) The image can also be straightened on the sheet by turning the front guide bar out of parallel. This is not a recommended procedure, as misregister may result.

(4) The side-to-side position of the image can be changed by moving the side guide. For large changes (over $\frac{1}{8}$ in.), the side guide can be moved by loosening the vertical knurled locking screw above the side guide, moving the side guide to the desired new position, and retightening the locking screw. For small changes, the flange of the side guide can be moved by turning the horizontal micrometer screw alongside of the side guide. Moving the side guide closer to the center of the press causes the image to print closer to the side guide edge of the sheet. If the side guide has been moved any considerable distance, it is necessary to move the feeder pile until $\frac{1}{8}$ inch side guide push is again obtained. The registration wheels should also be checked and reset, if necessary.

k. Running Waste Sheets.

(1) Print the same waste sheets and examine

them for ink-water balance and "color." The amount and distribution of ink and water will be adjusted as needed and more waste sheets run until the proper density of color is obtained.

(2) In general, if the ink smears too easily on the printed sheet, there is too much ink being used. If the plate appears to be wet while sheets are printing, there is too much water being used. If the ink on the sheet has a gray, listless appearance, there is too much water being used. If a scum of ink appears in the nonprinting area of the plate, not enough water is being used.

(3) Run some sheets through the press twice and examine them for a blur. If a blur is present, it indicates misregister. The registration devices of the feeder must be adjusted where necessary to overcome this difficulty.

l. Getting Sheet OK'd by Supervisor. When a sheet with proper margins and color is printed, take it to the supervisor or senior pressman for an OK. Place the OK'd sheet in the work order jacket. All future copies must duplicate this sheet.

m. Starting Run.

(1) In order to check register during a run, use a pencil or a needle to make small registration marks on the plate in such locations that they will print at the extreme edges of the stock. Make these marks on the side guide side of the plate and on the side opposite. Position both marks near the gripper edge of the plate. The mark on the side guide side is a small "tee" with the head of the "tee" parallel with and as close as possible to the edge of the sheet. The mark on the opposite side is merely a short line perpendicular to the edge of the sheet and running off it. After some sheets have been run through the press, take 10 or 12 of them from the delivery board and, keeping the gripper edge of all the sheets aligned, "fan" or "slide" them sideways slightly. The location of the registration mark on each sheet in comparison with the other sheets indicates at a glance whether the various registering devices are adjusted and working properly.

(2) Set the counter at zero, and adjust the automatic pile receder to the thickness of the stock being run. The actual run can then be started.

(3) During the run, check the sheets frequently for misregister, scumming, filling in, or variation in color or amount of ink. If any difficulty appears, turn off the air pump and determine and correct the cause of the difficulty before continuing. See appendix E for a list of common printing difficulties.

n. *Ending Run.* When the last sheets feed through the press, turn off the air pump and let the press idle for two or three revolutions with the ink and dampener rollers riding the plate surface.

Then remove the ink and dampener rollers from the plate surface and stop the press. The extra charge of ink will protect the image when the plate is gummed and wiped dry.

Section X. WASHUP PROCEDURE

8-29. Introduction

A press with ink in it must not sit inactive for very long because the ink begins to dry on the rollers and in the fountain. If the press is to be inactive overnight or for several hours, or if a new color of ink is to be run, the press must be "washed up" thoroughly. In washing up, the blanket and cylinders, the dampening assembly, and the general press area are cleaned, as well as the inking assembly.

8-30. Operational Instructions

a. *Materials Required.* The materials required for washup are: an ink solvent for use on rubber, a can with a spout (like an oil can), a washup tray, some sheets of paper, a sponge and water, plate etch, pumice powder, an ink knife or spatula, and several absorbent rags.

b. *Preparing for Washup.*

- (1) Remove all stock from the delivery board.
- (2) Fold some waste sheets of paper over the dampening assembly to protect the molleton covering on the rollers.
- (3) Scrape the ~~unused~~ ink out of the ink fountain, place it in an ink can if it is still usable, and mark the can with pertinent information as to any "doctors" which may have been added.

c. *Cleaning Inking Assembly.*

- (1) Remove the ink ductor roller, tighten thumb screws, and hand clean with rags and solvent. This is the only ink roller which remains out of the press during washup.
- (2) Remove the ink fountain blade and hand-clean with rags and solvent.
- (3) Hand-clean the ink fountain roller with rags and solvent.
- (4) Place the washup tray in position and secure against the front vibrator.
- (5) Start the press. If the ink is hard to clean up, the addition of fresh ink or clear varnish may be necessary to assure a clean washup.
- (6) Using a can with a spout, pour solvent

over one-half of the ink rollers. If solvent is poured across the full length of the rollers, there will not be enough friction to turn the friction-driven rollers.

(7) Use only enough solvent to loosen the ink from the rollers. Any excess solvent will splatter over the press and cause much extra work.

(8) When half of each ink roller is clean and dry, pour solvent in the same manner on the other half of the ink rollers.

(9) When the ink rollers are clean and dry across their full length, stop the press.

(10) Remove the washup tray, dispose of its contents among the dirty rags, and hand-clean the trays with rags and solvent.

(11) Clean off the strip of ink left on the vibrator roller by the washup tray with a rag and solvent.

(12) Turn the press by hand with the fly-wheel and clean the ends of the rollers with a rag and solvent.

d. *Cleaning Dampening Assembly.*

- (1) Remove the protective sheets of paper from the dampening assembly after the inking assembly has been cleaned.
- (2) Sponge up the solution from the water fountain and throw it away.
- (3) Scrub the dirt/fabric covered dampener rollers, rinse them, and hang them in a rack to dry.
- (4) Clean the metal dampener rollers with pumice powder and water, and gum them.

e. *Cleaning Cylinder Assembly.*

- (1) Wash with solvent and regum the plate, if necessary.
- (2) Remove the plate.
- (3) Clean the surfaces of the plate and impression cylinders and the bearers of the plate and blanket cylinders of all ink, gum, and dirt.
- (4) Wash the rubber blanket with water first and then scrub it with solvent and pumice powder. Powder it with a mixture of sulfur and talcum.

CHAPTER 9

BINDERY OPERATIONS

Section I. INTRODUCTION

9-1. Processing the Printed Product

a. The lithographic cycle is not necessarily complete with the printing of the sheets on the offset press. Additional processing is frequently necessary before a final product is delivered to the user. This processing may include trimming and cutting, folding, stitching or other binding, punching, padding, or perforating, depending on the nature of the finished product. Military printing plants generally are equipped to perform most of these functions.

b. Standard military maps normally do not require either cutting or folding. Their formats have been designed to fit the sheet size handled by field presses, and any necessary trimming of stock is done before the maps are printed. Among the few exceptions are special purpose maps, such as road maps and air charts, which usually are accordion-folded to facilitate handling by the vehicle operator, pilot, or navigator.

c. Other products of military printing plants usually require cutting, and sometimes drilling, punching, folding, collating, and binding. Chapter 6 of this manual discusses the arrangement of material on flats for combination layouts. Proper

planning at the layout stage eliminates many subsequent problems in the bindery. Forms are almost always printed in multiples, and sometimes combine different sizes and shapes on one sheet, requiring careful cutting to separate them. Pamphlets must be correctly folded, and the pages of books and booklets, besides being folded, must be fastened together and trimmed.

9-2. Equipment

The extent of bindery operations varies greatly among military printing plants, ranging from simple cutting and trimming to the binding of good-sized books. The equipment available for these operations also varies widely. This chapter discusses the characteristics and operation of a typical, power-driven cutter, buckle-type folder, and wire stitcher. Although the make, model, and capacity of any such equipment in a particular installation may differ from those discussed herein, the principles of operation are the same. The operator should have both a complete understanding of these principles, and a thorough familiarity with the make and model he operates. The operation and maintenance manuals or the manufacturer's instructions for each model provide the necessary specific information.

Section II. POWER-DRIVEN CUTTER

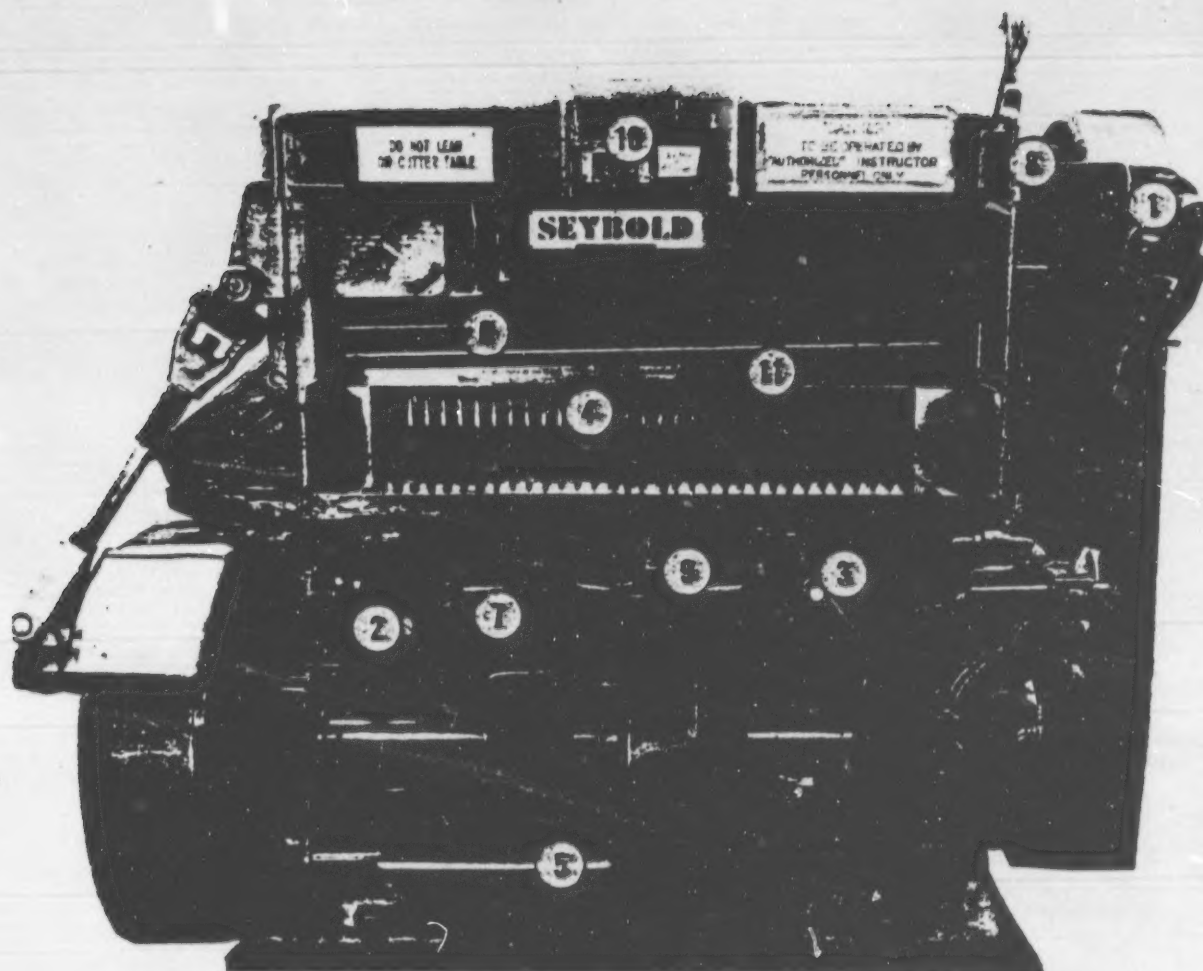
9-3. Description

The power-driven cutter (fig. 9-1), once it has been set and the paper loaded, operates automatically. The position of the back gage, which is a movable, fingered metal bar, determines the width of the cut. The paper is loaded on the cutter table and jogged against the back gage, which has been positioned the desired distance from the knife by means of a handwheel. The operator raises the safety lever with one hand and depresses the knife lever with the other. The knife cannot be depressed until the safety lever is raised. After the

cut is made, the knife returns to its original position and is automatically locked to prevent a repeat stroke. The braking mechanism is similar to that on an automobile and requires the same kind of care and occasional adjustment. There is an automatic clamping device which descends just ahead of the knife to hold the paper flat. This clamp can also be operated with a foot treadle, independently of the knife.

9-4. Safety

Good safety practices, which are essential



- | | | |
|-----------------|-----------------|---------------|
| 1. DRIVE MOTOR | 5. FOOT TREADLE | 9. HAND WHEEL |
| 2. SAFETY LEVER | 6. KNIFE | 10. DIAL |
| 3. KNIFE LEVER | 7. LOCK LEVER | 11. CLAMP |
| 4. BACK GAGE | 8. CONTROLS | |

Figure 9-1. Power-driven cutter.

throughout the lithographic cycle, assume critical importance in the operation of the cutter. The knife blade can sever fingers and hands, and although there are built-in safety features, carelessness in operation or maintenance can cause bodily injury or can damage the machine. A damaged or malfunctioning cutter can be a serious safety hazard.

a. One Operator. At any given time, only one person shall operate the paper cutter. The design of the safety lever insures that both hands of the operator are out of the range of the blade when

the cutter is in operation. If more than one person operates the levers, the safety aspect of this feature is eliminated. Men handling paper before or after cutting should keep clear of the machine and operating area.

b. Foreign Material. Check all stock for material that would cause damage to the blade, such as wood chips or steel rulers.

c. Dull Knife. Do not increase the pressure to eliminate cutting difficulties caused by a dull knife, as this could spring the knife and make it

hazardous to use. A piece of soap or wax rubbed along the bevel makes a dull knife cut easier, and gives a cleaner face to the cut. Apply lubrication very lightly, however, and do not lubricate when the knife is sharp. Changing knife blades should be done only by experienced operators. If the blade is over 40 inches long, two men are needed to change it.

d. Brakes. Do not oil or grease the brake leathers, as this makes the brake ineffective. If there is a downward creep of the blade at the end of each stroke, the brake may need adjustment. Consult the manufacturer's instructions for the particular model of cutter before attempting to adjust the brake.

e. Safety Washer. The safety washer is a gear-like connector on the end of the drive shaft which is designed to break under less stress than the rest of the machine. This prevents serious damage to the cutter. If a safety washer breaks, it must be replaced after the cause of the break is determined and corrected. Some causes are a dull knife, grabbing clutch, loose drive shaft brake, foreign matter in the gear train, excessive clamping pressure, and excessive cutting load. After the cause of the break has been corrected, remove the safety washer screw in the drive shaft end, engage the clutch and turn the flywheel by hand. When the tongue on the drive shaft is perfectly aligned with the tongues on the gear, install the washer, replace the screw, and tighten.

f. Housekeeping. Poor housekeeping in and around the cutter contributes to many accidents. Wet floors or improperly stored equipment can cause trips and falls. These are always dangerous, but near the cutter, they are doubly so. Keep the area clean, the floors dry and unwaxed, and all equipment in its proper place when not in use.

9-5. Care of the Cutter

a. Blade Adjustment. Cutting completely through the stock depends upon proper adjustment of the blade to the cutter stick. This setting is done by maintenance personnel either in the field or at base operations.

b. Keep the Knife Sharp and the Machine Oiled. Always keep the knife sharp and the machine well oiled to prevent friction and loss of power.

c. Cutting Sticks. Do not allow the knife to drive into the cutting stick. This usually is caused by

improper blade adjustment. Turn or replace the cutting stick when clean cuts can no longer be made.

d. Hard Jogging Against Back Gage. Do not jog the paper hard against the back gage. Continued heavy jogging against the back gage will throw it out of alignment.

e. Oil Table and Knife. When the cutter is not in use, cover the knife and table with a thin coating of oil to prevent rust.

f. Lubrication Guide. Consult the lubrication guide in the manufacturer's instructions to make sure the recommended type of oil and grease is used during maintenance of the paper cutter.

9-6. Operating Controls

(Nos. in parentheses are keyed to fig. 9-1)

a. Starting Drive Motor. To start the main drive motor (1), push control button (8) and allow a few seconds for the motor to accelerate the flywheel to running speed before cutting.

b. Safety Handle. To actuate the cutting cycle the safety lever (2) must be lifted with the left hand before depressing the knife lever (3) with the right hand. This is the most important single safety feature of the cutter. The knife lever cannot be depressed until the safety lever has been lifted. The operator cannot have his hands under the cutter if both hands are on levers simultaneously.

c. Back Gage. To move the back gage (4) forward or backward, turn the hand wheel (9), located under the cutting table. This shows the length or width of the cut on the dial (10) located above the cutting table, when the paper is flush against the gage. To adjust the gage for a cut, turn the hand wheel until the desired measurement is correct on the dial. A lock (7) is provided for this wheel when repeated cuts at the same dimension are to be made.

d. Foot Treadle. A light foot pressure on the treadle (5) will lower the clamp (11) when the knife is not operating. This holds the top sheets of paper in register until the clamp pressure is applied by the machine. It also aids in pressing the air from the paper.

9-7. Operations

a. Handling Paper.

(1) *Size of lifts.* When transferring stock from skid to cutter table, it is important to avoid disturbing the alignment of the paper in the stack.

It is better to take small amounts, rather than large quantities that can easily shift out of alignment.

(2) *Paper curling.* If the paper curls up at the back against the gage, it will not cut accurately. Turn it over so the top sheets are flat, or put a weight on top if the cut is of sufficient width that the weight will not interfere with the clamp. Paper usually cuts better when the curl is down.

(3) *Jogging paper.* Jog paper against the gage by pressing the ball of the thumb against the front of the lift from top to bottom. Jog paper against the gage and aide frame before each cut. Tamping with a wood block helps to keep paper in line. Do not move the gage until the entire amount of stock has been cut.

(4) *Cutting large sheets of paper.* When cutting large sheets of paper, drive the air from between the sheets before the full clamp pressure is applied; otherwise the paper may slip out of register. This is easily done by drawing a weight across the paper. Then a gentle pressure of the clamp with the foot treadle will drive out additional air before the full clamp pressure is applied.

b. Size of Lift.

(1) *Space.* Leave about $1\frac{1}{2}$ inches between the top of the lift and the bottom of the clamp when cutting 22 x 29 map stock so that the knife

may gain full momentum before striking the paper.

(2) *Stock peculiarities.* Some stocks are harder to cut and harder on the knife than others, and put a greater strain on the machine. Newsprint, book paper, and onionskin are examples of easy to cut paper. Coated, cover, and gummed papers are stocks that are hard to cut.

(3) *Lift heights.* The desirable height of lifts varies, but in most cases the lift is limited to three or four inches in order to eliminate draw. Draw is the slight difference in size between the top sheets of a lift, and those on the bottom. When cutting sheets in very close register reduces the lift to not more than $3\frac{1}{2}$ inches.

(4) *Reduce draw with cardboard.* To reduce the draw in tough stocks, put two or three sheets of cardboard on top.

c. *Cutting Printed Stock.* Work that has been printed on the press may not always be square and true; therefore, it cannot be jogged against a straight edge gage and cut accurately. When cutting printed material, be sure to determine if there is a bad edge; if there is, do not jog that edge. Printed material must be jogged in perfect register. Be sure all printing guide marks and edges are in the same position throughout the lift. Bookwork normally is trimmed according to tick marks. Maps usually are not trimmed.

Section III. PAPER FOLDING MACHINE

9-8. Description

(Nos in parentheses are keyed to fig. 9-2)

a. Most military printing plants are equipped with buckle-type folding machines. These folders usually can produce both parallel and right-angle folds, the number depending on the size and capacity of the machine. All folding machines consist basically of a feeding mechanism (1), a registering unit (2) and conveyor (3), one or more folding units (4), and a delivery unit (5).

b. The folding unit operates in the following manner:

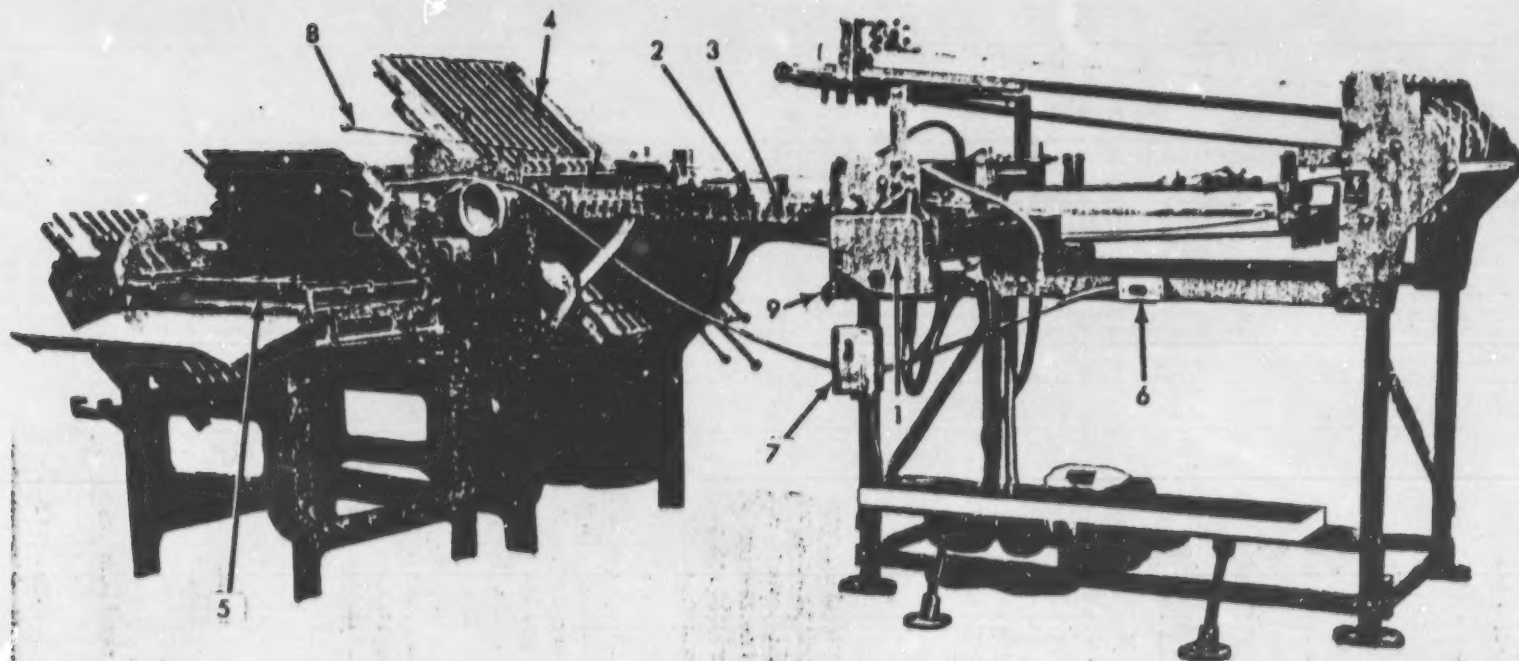
(1) The sheet of paper is fed between two rollers, which carry it to a fold plate, consisting of two metal plates with a stop, or gage, between them, preset at the desired distance.

(2) When the edge of the sheet reaches the stop, the paper buckles, and a third or fold roller grasps the buckled part of the sheet and moves it

forward, at the same time placing a fold at the point of buckle. Additional folding units repeat this procedure until the required number of folds have been made.

(3) If it is desired to by-pass a particular folding unit, a deflector is placed at the entrance to the fold plate, where it will cause the sheet to move on to the next part of the cycle.

c. The folder described in this section (fig. 9-2) is typical of those used by military printing plants. It can fold up to a 32-page signature, and can handle stock ranging in size from 5 x 7 inches to 25 x 38 inches, and in weight from 9-pound onionskin to 140-pound index. It can produce both parallel and right-angle folds in a number of combinations (para 6-14). An optional pasting attachment can be used to paste 6- and 8-page leaflets together, thus avoiding additional processing in the bindery.



1. Feeding Mechanism
2. Registering Unit
3. Conveyor

4. Folding Unit
5. Delivery Unit
6. Control-Folder.

7. Control-Blower-Vacuum
8. Feeder Control Rod
9. Variable Speed Control

Figure 9-8. Paper-folding machine.

9-9. Controls

(Nos. in parentheses are keyed to fig. 9-2)

a. *Electrical.* There are three electrical control boxes, each containing a *start* and a *stop* button. Two of the boxes contain controls for the overall operations of the folder. One is located on the operator's side of the folder (6) near the feeder end of the machine. The other is located on the frame between the parallel section of folds and the 8-page section of the folder. The third box is located on the frame on the operator's side of the folder. This box contains the blower and vacuum controls (7). When working on the electrical system, always snap the main power switch to cut off the power from the entire folder.

b. *Manual.* The feeder control rod (8) is located at the end of the parallel section of the folder. It allows the operator to stop the feeding of sheets while at the delivery end of the folder. When the rod is pushed, it moves a brake into place beside the flywheel, which is connected to the airwheel. This stops both the rotation of the flywheel and the rotation of the airwheel. When the airwheel is not rotating, the paper is not fed onto the feeder table. When the folder is running, pull the rod out to start the paper moving from the lower feed board to the feeder table. To stop the feeding of stock, push the rod in. The feeder control rod also operates in conjunction with the two sheet caliper. Both work by the same principle.

c. *Variable Speed Control.* The variable speed control (9) is located on the far side of the folder. It is a crank that either raises or lowers the motor to change the speed of the folder. When the motor is lowered, it increases the speed of the folder; when the motor is raised, the speed of the folder is decreased. A pulley with large flanges controls the position where the gears mesh. The amount of pull on the pulley determines the vertical and horizontal position and gear ratio which controls folder speed.

9-10. Feeding Assembly

a. *Description of Components.* The folding machine illustrated in figure 9-2 is a double-feeder-board model, which allows continuous loading of stock. The stock is placed on the upper loading board, and is conveyed by tapes to the lower feed board.

(1) Stock can be moved manually, by a handle on the operator's side of the folder, or automatically, by a governor roll, which moves the stock to the airwheel.

(2) *Ten holdown fingers*, at the feeder end of the folder, keep the stock in position while transferring it from the upper loading board to the lower feed board, and aid in fanning out the stock, keeping an even layer at the airwheel.

(3) The lower feed board also has a set of *conveyor tapes* to forward stock to the airwheel. The lower feed board *side guide* feeds the stock under the airwheel and alines it on the feeder table.

(4) The *airwheel* rotates continually. It picks up the top sheet by suction and forwards it to the feeder table.

(5) The *air blast nozzle* is a slotted tube with a regulating shield, located in front of the airwheel and the caliper, and below the feeder table. It can be adjusted to various sizes and weights of stock. When properly set, the air blast floats the first three or four sheets of stock.

(6) The *governor roll* is a wheel that controls the amount of stock to be kept under the airwheel. It is equipped with weights to balance the caliper roll. A light weight is used for normal stock, and a heavier one for heavy stocks.

(7) The *caliper* insures that only one sheet of stock is fed into the folding rollers at a time. It is set to trip the feeder automatically, if more than one thickness of stock enters, by jamming a wedge-shaped brake against the flywheel.

(8) The feeder drive wheels insure that the paper is started quickly and accurately. They are mounted on the same bar as the caliper, and are spring loaded to permit easy removal of damaged sheets.

(9) The *sheet gap governor*, on the operator's side of the folder, is used to decrease or increase the gap between sheets fed into the folder, thus regulating the speed at which the stock is run.

(10) The *side guide* consists of either glass marbles for light stock, or steel marbles for heavy stock, set in a steel retaining bracket. The marbles help drive the paper to the folding roller by adding weight to the stock and increasing the friction between the stock and the feeder table. There is a micrometer adjustment on the side for accurate register.

(11) The *feeder or register* table is equipped with a series of steel rollers which run diagonally to carry the paper against the side guide, for more accurate registration, and then transfer it to the folding units.

b. Operations.

(1) *Positioning of stock.* Place the stock on the upper feed board *face down*. Then fan the paper out so that one sheet overlaps all but 1/16 inch of

the sheet below it. When fanning stock, keep the paper jogged neatly to the side guide. This insures that the paper is fed into the feeder at exactly the same place every time. When loading the upper feeder board, do not load the stock over the top edge of the side guide.

(2) *Amount of stock to be fed.* When setting the feeder, turn the hand crank to bring the stock so that the leading edge of the stock is even with the wind brake plate. Start the feeder, arranging the leading edge of the stock to stick over the edge of the wind brake plate by $\frac{1}{4}$ inch. Adjust by moving the stock with the bank feed adjustment screw that adjusts the guides on either side of the airwheel.

(3) *Back stop rollers.* Set the back stop rollers so they are resting on the top sheet about $\frac{1}{2}$ inch from the tail edge of the sheet. This will prevent the air blast from sliding the sheet away from the airwheel.

(4) *Airwheel.* The speed of the airwheel is controlled by a starwheel on the operator side of the folder. The amount of suction is regulated by the lever marked *S* on the side of the frame near the overall electrical controls. Position the airwheel to the left of center on the stock to give the stock a slight angle so that it will stay in tight against the side guide.

(5) *Air blast nozzle.* To control the amount of air from the air blast nozzle, use the lever marked *A* on the same casting as the suction control lever. Never set the nozzle directly below the suction of the airwheel, as they will counteract each other.

(6) *Governor roll.* Set the governor roll as near to the airwheel as possible.

(7) *Feeder drive wheels.* Set the feeder drive wheels as close to the caliper as practical for the size stock that is to be run, and with enough tension so that the paper pulls slightly toward the side guide. Set the feeder drive wheel that is closest to the operator side with slightly less tension than the other wheel.

(8) *Sheet gap governor.* The sheet gap governor is adjusted in conjunction with the airwheel by the same starwheel that controls the airwheel speed.

9-11. The Folding Procedure

The following is a step-by-step description of how a sheet of paper goes through standard folding sections of a typical folding machine. Figures 9-3 through 9-8 illustrate the procedure.

a. *Step 1.* The sheet is advanced from the feed table or cross carrier, and enters between the 1st and 2d rollers of the folding section. If, according to imposition requirements, the first fold is to be made in the number 1 fold plate, the number 1 deflector is raised by the operator during make ready, thereby opening the number 1 fold plate. The 1st and 2d rollers drive the sheet up into the open number 1 fold until the leading edge of the sheet strikes the fold plate gage, which has been preset by the operator to fold size requirements (fig. 9-3).

b. *Step 2.* The forward movement of the sheet, stopped by the fold plate gage, causes the sheet to buckle and be drawn in between the 2d and 3d rollers, which fold the sheet at the required first fold line (fig. 9-4). Note that in steps 1 and 2, the first roller acts only as a drive roller, while the second roller, which is a stationary (not tension) adjustable roller, operates with the first as a driving roller and then with the third as a fold roller for fold plate number 1.

c. *Step 3.* If according to imposition requirements a second fold is to be made, using fold plate number 2, the once folded sheet is driven by the second and third rollers into the Number 2 fold plate, the deflector having been raised, until the folded edge of the sheet strikes the preset Number 2 fold plate gage (fig. 9-5).

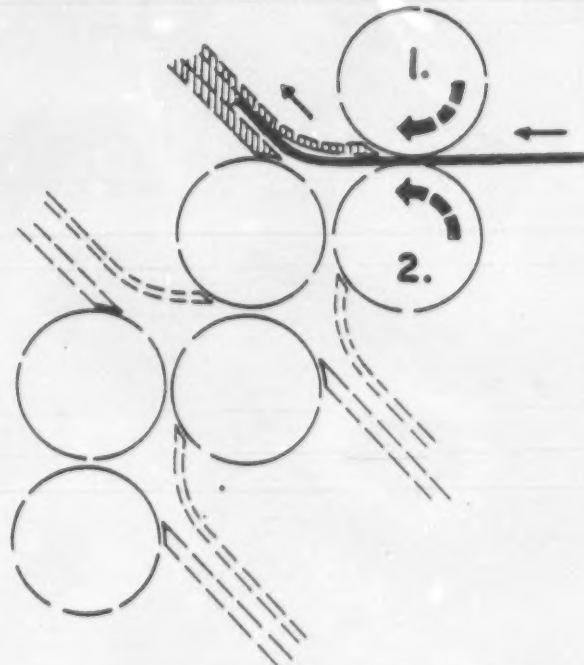


Figure 9-3. Step 1: The unfolded sheet is carried into fold plate number 1.

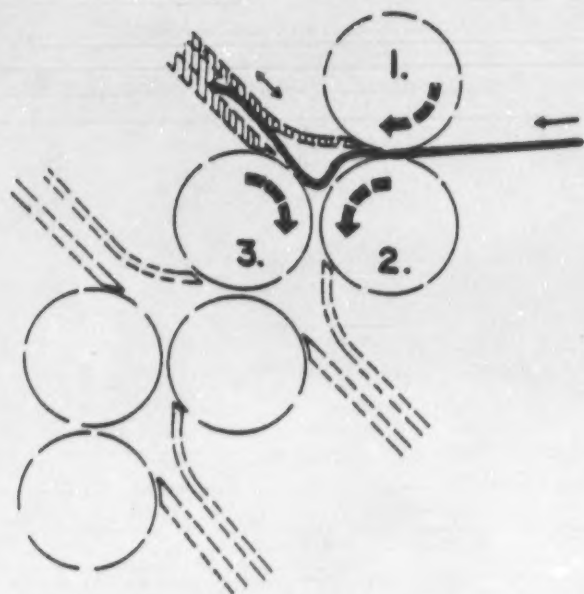


Figure 9-4. Step 2: The sheet buckles between the second and third rollers.

d. Step 4. The sheet buckles and is drawn between the third and fourth rollers which fold the

sheet at the required second fold line. Note that in steps 3 and 4 the second and third rollers serve as drive rollers to advance the sheet into fold plate number 2; the third roller then operates with the fourth as a folding roller for fold plate number 2 (fig. 9-6). If a third fold is to be made in a section equipped with three fold plates, the twice folded sheet is then driven by the third and fourth rollers into the third fold plate, its deflector having been raised. As in the previous folding operation, the sheet strikes the preset gage. This buckles the sheet and draws it between the fourth and fifth rollers which fold the sheet at the required third fold line. If the third fold was made in a section in which provision has been made for adding a fourth fold plate, the sheet will then be advanced by the fourth and fifth rollers until it strikes a removable deflecting plate (not shown in fig. 9-6) which directs the sheet in between the fifth and sixth rollers; the deflecting plate is easily removed when the fourth fold plate is added. The fifth and sixth rollers then advance the sheet to the slitter shafts.

e. Step 5. If four fold plates are available, the imposition might call for the third fold to be made

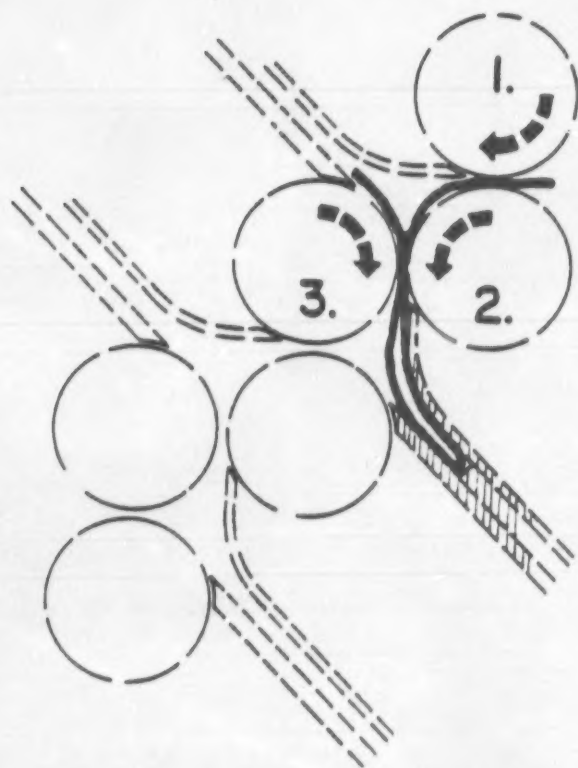


Figure 9-5. Step 3: The folded sheet is carried into fold plate number 2.

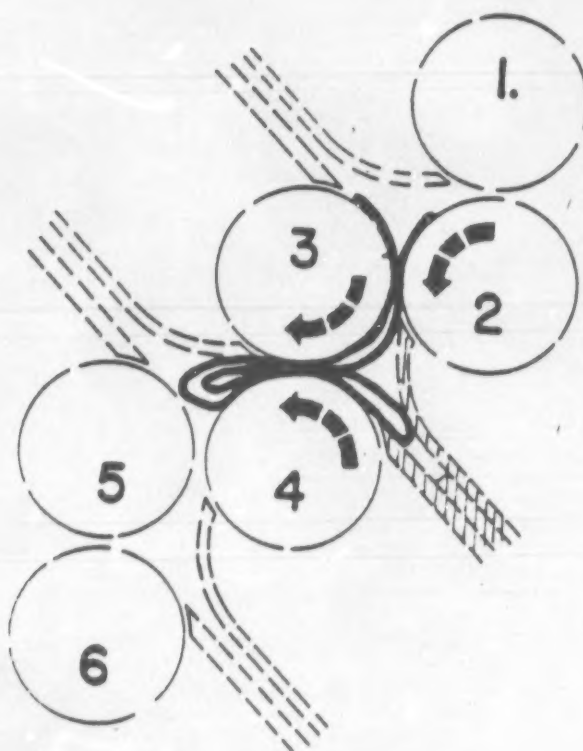


Figure 9-6. Step 4: The twice-folded sheet buckles between the third and fourth rollers.

in the fourth fold plate. In this case, the operator lowers the number 3 deflector which diverts the sheet from the third to the fourth fold plate. The twice folded sheet is advanced by the third and fourth rollers until it strikes the number 3 deflector which directs the sheet past the fold plate and between the fourth and fifth rollers (fig. 9-7).

f. *Step 6.* The fourth and fifth rollers then drive the sheet into the number 4 fold plate where it strikes the fold plate gage, buckles, and is drawn between and folded by the fifth and sixth rollers. The sheet is advanced by the same rollers to the slitter shafts where the signature is now scored, perforated, slit, or trimmed, to meet job requirements (fig. 9-8).

9-12. Delivery and Stackers

a. *Slitter Shafts.* Two slitter shafts are mounted on the frame at the end of each folding section. On these shafts can be mounted rubber rollers or perforators to score the sheet as it passes between them; slitters are a scoring device. Scoring a sheet makes it easier to fold. A trimmer

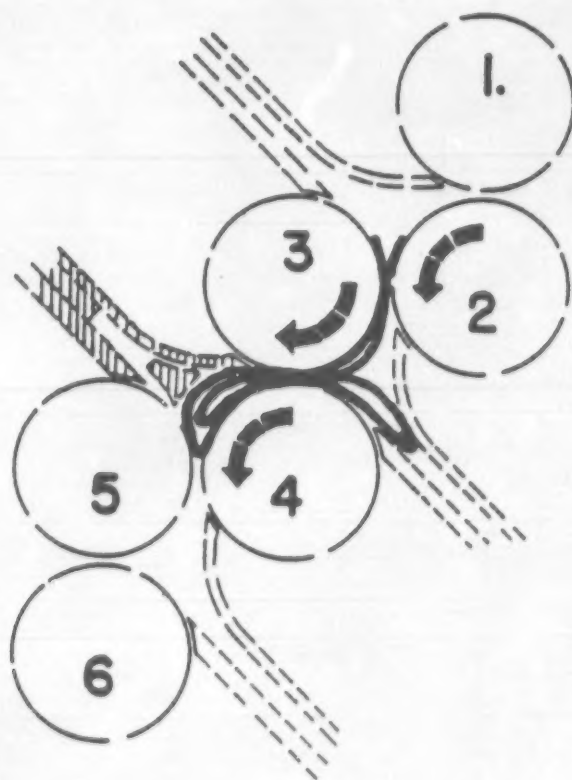


Figure 9-7. Step 5: The sheet is deflected from fold plate number 3 and is carried between the fourth and fifth rollers.

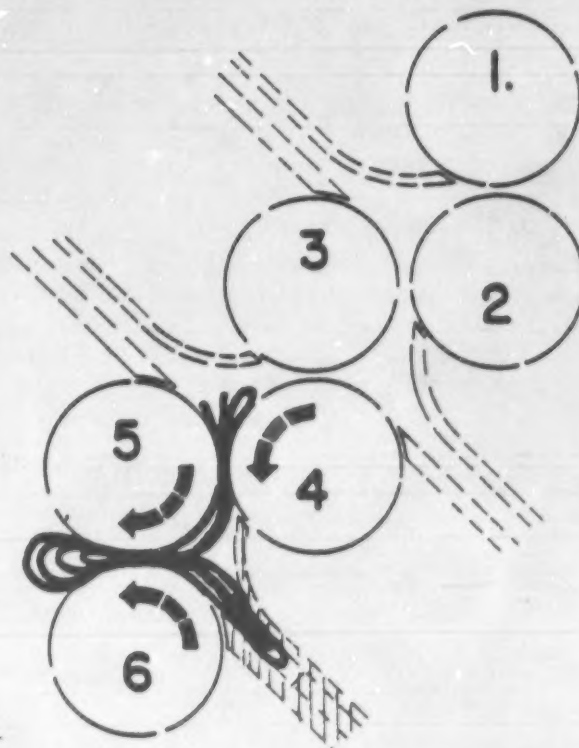


Figure 9-8. Step 6: Sheet is buckled by fold plate number 4 and carried between the fifth and sixth rollers.

can be mounted on a slitter shaft to cut off unwanted material.

b. *Stackers.* When the signature comes out of the folding section it goes between the slitter shafts. It is then dropped on a belt. Stacker rollers keep the folded edge of the sheet in contact with the belt so the completed work will flow smoothly onto the delivery tray, thus preventing pile-ups of folded sheets at the end of the folding section and subsequent jamming of the machine. If there is much spring in the folded sheet, a spring deflector should be used for a stacker. The spring deflector has a steel foot that rides on the work and is adjustable for different fold thicknesses. Both of the stackers mount on the cross bar on the delivery belt assembly.

c. *Delivery Belt.* The delivery belt is a removable assembly used at the end of the parallel section of folds if only four folds are desired; it is replaceable with a cross carrier if more folding is required. The belt on the delivery is spring loaded and the tension can be adjusted either to increase or to decrease the speed of the delivery belt.

d. *Cross Carrier.* The cross carrier is mounted at the end of the parallel section of fold if cross folds are required. It is similar to the feeder board, having a series of diagonal rollers with a side guide to insure the straight line feeding of paper into the next set of folds.

9-13. The Power Train

Gears control the power transfer from one section of folds to another. To hook into another section of folds—other than the parallel section which is on a direct drive—use a screwdriver to engage the gear on the shaft while the folder is not running.

The gears are on the operator's side of the folder between the parallel section of folds and the 8-page section of folds, and also between the 8 and 16, and the 16 and 32-page sections.

9-14. Lubrication and Maintenance

Regular lubrication, in accordance with the manufacturer's instructions, is essential for long service and proper operation of the folding machine. There are many grease fittings, oil cups, ball oilers and oil holes on each model of this type of equipment. Be sure to use the recommended weights of oil and grease.

Section IV. PAPER STITCHING MACHINE

9-15. Description

(Nos. in parentheses are keyed to fig. 9-9)

a. The paper stitching machine described in this section is a typical wire stitcher commonly used in military printing plants. It is more versatile than the stapler-type fasteners because, using a spool of wire instead of preformed staples, it can be adjusted to a greater range of paper thicknesses.

b. The wire stitcher consists of three main components: the head, which contains the spool of wire (1) and the feeding (2), straightening (3), and cutting (4) devices; the work table (5), on which the work is placed; and the foot treadle (6), which operates the machine (fig. 9-9).

c. *Types of Wire.* This machine can operate with either flat wire, in size 21 x 25, or round wire, in sizes No. 30, 28, 26, and 25. The larger the number, the finer the wire. Since flat wire has a tendency to take the curl of the spool, it should always be passed through the wire straightener pins.

d. *Methods of Stitching.* This model of stitcher makes both the saddle stitch, used to bind folded books and booklets, and the flat stitch, used to bind signatures or individually printed sheets stacked together (fig. 9-10). The saddle stitch is made along the fold of the opened work; the flat stitch is made along the folded edges of the stacked signatures, or the left margin or top of the cut sheets.

table must be adjusted for either saddle or flat stitching.

a. *Threading the Machine.* To thread the machine, place the spool of wire in the bracket so the wire feeds down from the top of the spool. Pass the wire from the spool through the eye in the top of the straightener. The straightener is a spring steel arm that holds the wire taut and also removes any kinks or curls in it. From the eye, pull the wire down to the straightener pin. Pass the wire under the first pin, over the second pin, and under the third pin. Pass the wire between the feed pin and the feed sector. To prevent misfeeding, keep the wire taut at all times while loading. Pass the wire under the wire check, through the cutting tube and supporters. After the machine is loaded, make a few stitches to check the feed sector for proper operation.

b. Adjusting the Table.

(1) To set the table for saddle stitching, disengage the work table arms so the table breaks down the center and forms a saddle—an inverted V

(2) For flat stitching, raise the work table and engage the table supports. The two halves form a flat work table to support the material to be stitched.

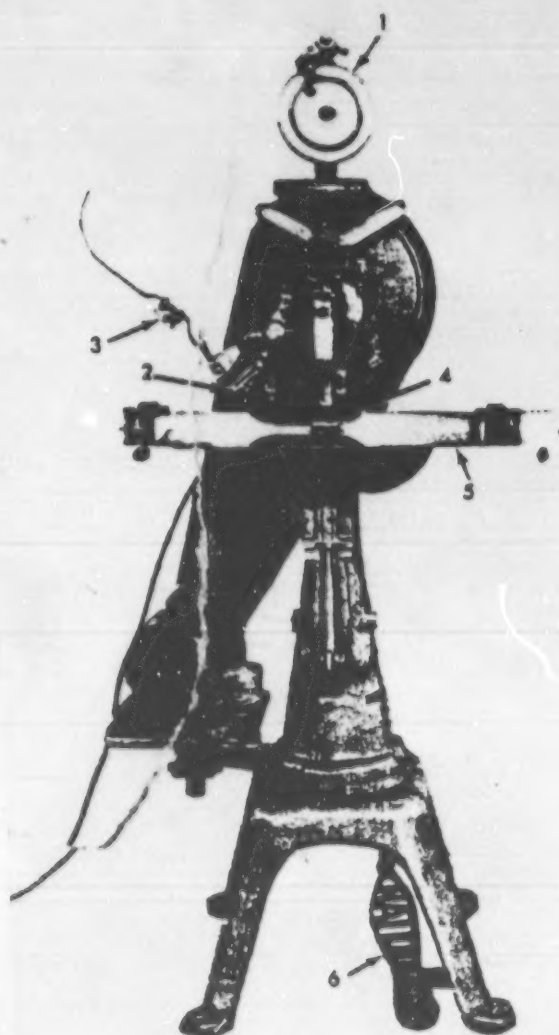
c. Setting for Stitching Thickness.

(1) Open the head by turning the handwheel; this both opens the gap and automatically sets the feed of the wire to the desired length.

(2) *Gage Clamps.* Place the paper to be stitched into the gage clamps. If a saddle stitch is to be made, measure only the thickness of the part

9-16. Operation

To operate the stitcher, it must first be threaded, then set for the proper stitching thickness. The



- | | |
|----------------------|-----------------|
| 1. Spool of Wire | 4. Cutter |
| 2. Feeder Pin | 5. Work Table |
| 3. Straightening Pin | 6. Foot Treadle |

Figure 9-9. Wire-stitching machine.

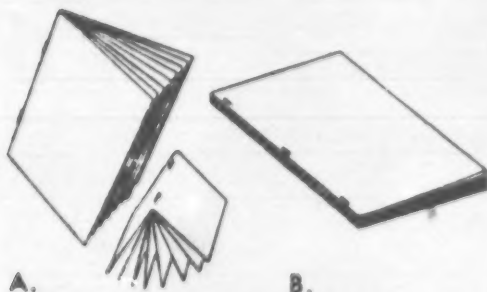


Figure 9-10. Two methods of stitching:
a. saddle; b. flat.

to be stitched. Turn the hand wheel until the gage clamps hold the paper firmly, but still allow the paper to be withdrawn.

(3) *Maximum thickness.* This stitcher binds paper up to a maximum of $\frac{3}{8}$ inch thick. Use a size of wire strong enough to keep from bending before it passes through the paper.

d. *Stitching the Copy.*

(1) In saddle stitching, the copy is opened and positioned so that the fold is centered on the apex of the V-shaped table. Holding the paper in place, depress the foot treadle to stitch the copy.

(2) In flat stitching, a guide bar with movable stops is adjusted as required to aid in the correct placement of the copy and the spacing of the stitches. As with saddle stitching, the machine is activated by depressing the foot treadle.

(3) During operation, check the stitching at regular intervals. If the machine is correctly adjusted, the staples will fold neatly and evenly against the underside of the work.

9-17. Care of the Stitcher

a. *Turning the Cutter.* If one or both ends of the wire do not drive through the folded work, buckling the staple, the problem can frequently be traced to a dull circular cutter, which does not cut the wire clean and square. To get a new and sharp cutting edge, turn the cutter to a new position. Be sure to see that the screw holding the cutter is securely tightened after the cutter is turned.

b. *Lubrication.* Lubricate well with a good grade of machine oil. Occasionally apply a little oil on the sides and front of the former and driver bars. Apply very little oil to these bars as excess oil will drip down onto the work.

9-18. Safety

As with most of the power-driven equipment in the pressroom and bindery, carelessness in the operation of the wire stitcher can cause injury. The following safety practices must be observed at all times.

a. *Position of Hands.* Keep hands well away from the stitching area when guiding the work. Since the staple former and head hold the paper securely in place, there is no need to have hands too close to the stitching area.

b. *Position of Foot.* Depress the foot pedal only when you are ready to stitch. The stitching move-

ment of this machine continues as long as the foot pedal is depressed, even if the wire is depleted.

c. Disconnect Power When Adjusting. Discon-

nect the power cable from the power source when any adjustments are to be made on the stitcher. This prevents the machine from accidentally starting a stitching cycle.